COMPUTERWORLD

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NEWSPAPER

Software for 'Basic' 4300

PROGRAM PRODUCT	MONTHLY LEASE	MONTHLY SUPPORT
DOS/VSE	None	$200 (4331) 570 (4341)
VSE/Advanced Function	$130	44
VSE/Power	40	12
VSE/Vsam	35	17
VSE/Vsam/SM	20	7
DL1	295	100
CICS/DOS/VS	325	150
VSE/Ditto	26	5
VSE/Fast Copy	300	None
DOS/VS Sort Merge	135	20
DOS/VS RPG-II	100	5
DOS/VS Cobol Compiler and Library	141	6
TOTAL	$1,547	$566 (4331) $936 (4341)

Figure 1

Software for IBM 4300 May Cost More Than Hardware

By E. Drake Lundell Jr.
CW Staff

WHITE PLAINS, N.Y. — Users looking into the IBM 4300 series of mainframes are finding that the software charges may be more than they expected.

In fact, in some cases the software will cost the user more than the hardware over the system's useful life. And IBM has indicated that software charges will go even higher in the future as more components are taken out of the System Control Program (SCP) and offered as fee-carrying program products (see story on Page 4).

A list compiled originally by William Easterbrook at Kidder, Peabody & Co. and confirmed and updated by *Computerworld* (Page 4) indicates that for a basic 4331 system, users will pay about 100% of the hardware price for software; on sophisticated communications systems, the charges could run up to more than 200% of the hardware charges.

Charges for software on the basic 4341 system will be about 30% of the hardware price, while the more sophisticated system will carry software charges of about 50% of the hardware price.

Average Users' Costs

Although IBM has not yet released a full list of program products available with DOS/VSE to the press, *Computerworld* has obtained a release given to the financial community which lists 52 program products available with the system, 37 of which are completely new.

In order to determine what average users would be paying for software, Figure 1 shows a number of program products selected as typical for a "basic" system and Figure 2 (see Page 5) shows software for a more advanced "communications" system. The figures, of course, vary by installation; while they could be lower, in many cases the charges will actually be higher than those chosen.

Figure 1 shows the monthly software fees will be $2,113 for the basic 4331 and $2,483 for the basic 4341.

The lease price (on a two-year lease) for the 4331 with the basic CPU and memory is $1,679/mo and the purchase price for the system is $68,760. The respective prices for the 4341 are

(Continued on Page 5)

From 'Whether' to 'How Soon'

Emphasis on Deregulation Shifts

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The argument over the future of the telecommunications industry seems to have shifted from whether to deregulate to how soon complete deregulation can be achieved, if testimony presented at congressional hearings here last week is any evidence.

This is in marked contrast to the tenor of last summer's hearings on a rewrite of the Communications Act of 1934. Those hearings were taken up by endless discussions on the wisdom and feasibility of deregulation. Now, it seems, deregulation is taken for granted.

Complete deregulation could be effected immediately if not for the possibility that cross-subsidization by AT&T of its various affiliates would monopolize certain telecommunications markets, Henry Geller, head of the National Telecommunications and Information Administration, told the Senate Communications Subcommittee last Tuesday.

'Unnecessary Discretion'

The subcommittee is considering two bills that propose a step-by-step deregulation scheme administered by the Federal Communications Commission (FCC). The legislation calls for market forces, rather than government regulations, to foster competition as much as possible. A similar bill is pending before the House of Representatives. All are Communications Act rewrites.

Geller told the Senate subcommittee he is concerned that the FCC will not be able to oversee efficiently the deregulation process proposed in the legislation introduced by Subcommittee Chairman Ernest F. Hollings (D-S.C.) and ranking minority member Barry Goldwater (R-Ariz.).

According to Geller, the Senate legislation as presently drafted would give "unnecessary discretion" to the regulatory commission. The Senate bills would leave the FCC intact, whereas the House version calls for the abolition of the FCC and the establishment of a smaller communications regulatory commission with more restricted jurisdiction than the present FCC.

"A suitable transition period to a free market environment must be specified, with an initial deregulation of firms

(Continued on Page 4)

In Trouble With ACS, AT&T Changes Strategies

By Ronald A. Frank
CW Staff

After publicly admitting that its Advanced Communications Service (ACS) is suffering in-house development problems, AT&T has embarked on alternative strategies to implement its promised network.

Last February, AT&T informed the Federal Communications Commission that "the software development program for ACS will require a significant further effort previously unforeseen." Many industry experts interpreted that statement as an admission that AT&T was having problems with software work at locations within the Bell System.

The statement to the FCC was followed by recent press reports that the telephone company is considering a halt to ACS. But what seems more likely, according to industry experts, is that Bell has modified — not abandoned — its original ACS plans. The modified approach is said to include several strategies.

First, instead of a nationwide service, Bell System operating companies may configure smaller ACS-like nets within their own territories. In many cases this type of net will cover several states. Southern Bell reportedly is ready to offer this kind of network to customers.

Second, it is possible that Bell may consider an overbuild of an internal DP data communications network that has been operating for several years to serve the in-house needs of the Bell System operating companies.

Finally, indications are growing that Bell has sought outside help in the development of the ACS service. Most informed experts believe this help will come from network specialists within Digital Equipment Corp.

Independents Approached

The idea that individual Bell System companies are building their own versions of an ACS-type net has been reinforced by reports that phone company representatives have approached independent suppliers with expertise in the packet network area. One such supplier was approached by several operating companies at a recent data communications conference. The queries all had to do with using non-Bell equipment to build a re-

(Continued on Page 8)

OS Sort by Itel Comes in Ahead Of Competitors

By Don Leavitt
CW Staff

SAN FRANCISCO — Itel Corp. introduced a sort package for IBM OS and OS/VS installations last week, and tests indicate it can outperform competitive products already on the market.

At this time Dynasort is not a full-service sort; Itel was quick to note that it works only with fixed-length records. In that arena, however, benchmarking shows it uses fewer EXCPs and less Service Request Block (SRB) time — under OS/MVS — and less CPU time than either IBM's 5740-SM1 — better known as the "Iceman" sort — or Whitlow Computer Systems, Inc.'s Syncsort, an Itel spokesman claimed.

The company is working on both a DOS/VS version and support for variable-length records. It expects to have both of those enhancements available in the third quarter.

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Answer Not Very Clear

DOS/VSE, DOS/VS Incompatible?

By Tim Scannell
And E. Drake Lundell Jr.
CW Staff

WHITE PLAINS, N.Y. — Just how compatible is IBM's new DOS/VSE operating system with the previous DOS/VS?

That's a question many users and software vendors are asking as the delivery data looms for DOS/VSE, which will be available with the 4300 series of mainframes in June.

The answer isn't very clear. In the first place, IBM has refused to divulge many technical details about the operating system and a great deal of confusion exists over just what has and has not been changed.

In addition, IBM salespeople are apparently playing down any incompatibilities. They are also playing down the number of program products that will have to be purchased in order to use the operating system, since the software costs can run more than 100% of hardware costs on typical systems (see story on Page 1).

It is clear, however, that DOS/VSE offers users significant new functions — at an increase in cost — over DOS/VS.

Some of the Problems

Most applications programs will be compatible with the new operating system, but any utility or systems programming that addresses the Logical Transient Area, the Label Area or the Communications Region will have to be changed, several sources have indicated.

"Especially vulnerable are source program maintenance packages, sorts, backup/restore utilities, report writers and disk space and tape file maintenance packages," according to Warren L. Culpepper of Culpepper and Associates, a new Atlanta-based consulting firm.

Many software vendors have depended on DOS/VS' Logical Transient Area to run their packages, but this area has been eliminated with DOS/VSE in favor or the Shared Virtual Area, several sources said.

Another problem area concerns the use of the Direct Access Method (DAM), which will not be supported at all under the DOS/VSE. All applications and software packages which depend on DAM will have to be changed [CW, Feb. 26].

Furthermore, Isam will be supported only through the use of an Isam Interface Program running under Vsam, which will require more machine resources for users who wish to keep using this access method.

"IBM is trying to push users into Vsam, even though it isn't any faster and is more inefficient than Isam in many cases," one industry source said.

Another potential problem is the DOS/VSE supervisor, which will take up twice the storage needed by the DOS/VS supervisor — 160K bytes compared with 80K bytes. With memory becoming so cheap, however, few view this as a problem.

Rather, the bulkier operating system may cause longer path lengths for some programs and therefore a somewhat degraded performance on certain jobs.

'Opportunity, Not Threat'

One vendor sees the IBM move as "an opportunity, rather than a threat."

Lee Kete, president of Turnkey Systems, Inc., said that "IBM has locked everybody in with VSE and the choice is very clear to the DP manager — if he goes with IBM program products, [the installation is] going to stick with IBM hardware because DOS/VSE is so locked into the Extended Control Program Support [ECPS] software and the microcode."

Although DOS/VSE will run in 370 mode, ECPS runs in native mode on the 4300 systems. ECPS depends heavily on microcode to perform.

Many sources expect that users will opt for the ECPS mode because of the increased performance that is available with the use of microcode.

Kete believes users will turn more to independent vendors in the future to avoid being so locked into IBM. Users not locked into the IBM microcode could make the switch to software-compatible processors easier, he noted.

"Users will have to decide which camp they are in," he said. He is "hopeful" that many will opt for independent software.

Although some people will become or remain all-IBM users, "a good number are going to decide that this is a real threat to their independence and their ability to take advantage of the plug-compatible mainframes or used or third-party equipment," he added.

'Back to Drawing Boards'

Most independent software vendors have indicated they will upgrade their offerings to run under the new operating system, but several have complained that IBM has so far been "stingy" with technical details that would allow them to make the upgrades.

The net effect of the incompatibilities, according to Culpepper, will mean "back to the drawing boards" for both users or vendors.

"A good number of DOS/VS application products and the majority of DOS/VS system software and utility programs must be modified to run under DOS/VSE and support the new disk drives. Many of these products may require major design changes.

"There is no reason to panic," he added, noting that users and vendors alike will have to determine the best strategy for their individual business plans and operations.

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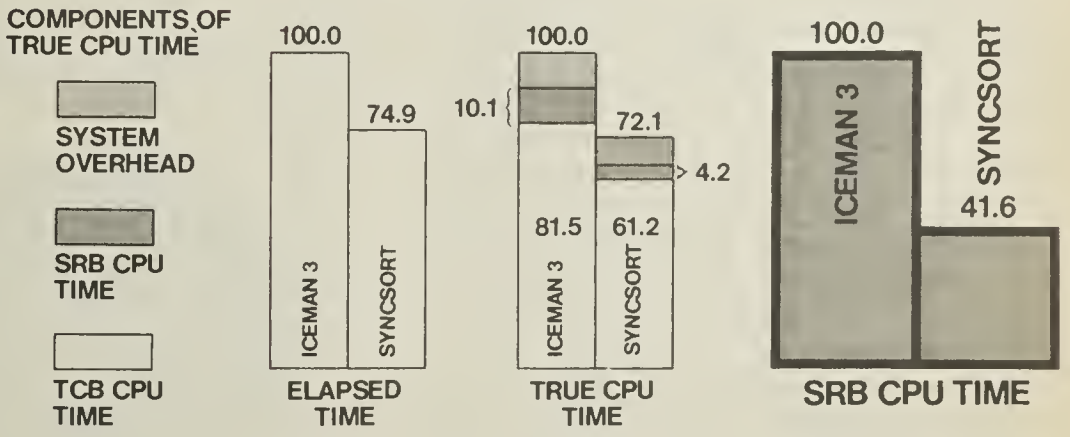
- SRB Time (Service Request Blocks) is non-preemptible. Programs running under SRB CPU Time "will not lose control to higher priority tasks or SRBs until control is given up voluntarily," as IBM's own Systems Programming Library puts it. In other words, plenty of sweat for everybody. Particularly for non-sorting jobs in the mix if your sort uses a lot of SRB TIme.

The charts below show you the difference in SRB Time between SyncSort OS and a leading 97-pounder — IBM's 5740-SM1, Release 3:



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IBM Admits Program Fees to Rise Even Higher

Charges for IBM 4300 Program Products

NAME	NUMBER	MONTHLY CHARGE	MONTHLY SUPPORT CHARGE	MONTHLY ADDITIONAL CHARGE[1]	PREVIOUS PRICE
DOS/VSE	System Control Program		$200 (4331) 570 (4341)	$120 (4331) 343 (4341)	
VSE/Advanced Function	5746-XE8	$130	44	26	
VSE/Power	5746-XE3	40	12	7	
VSE/Power RJE	5746-XE3 (Feature)	70	17	10	
VSE/Power (Shared Spooling)	5746-XE3 SS	30	7	4	
VSE/Vsam	5746-AM2	35	17	10	
VSE/Vsam/SM	5746-AM2	20	7	4	
DLI	5746-XX1	295	100	60	
DL Entry[2]	5746-XX7	295	20	12	
Advanced Communications Function (ACF)/Vtame	5746-RC3	95	56	34	
ACF/Vtam Release 2 Base	5746-7	70	55	33	$125
ACF/Vtam R2NNFF	5746-RC3	160	165	99	325
VSE/ICCF	5746-TS-1	60	20	12	
VSE/ACLR	5746-XE7	35	16	10	
CICS/DOS/VS	5746-XX3	325	150	90	475
CICS/OS/VS	5740-XX1	1,000	—	—	
DMS/CICS/VS-OS	5740-XC5	230			
DMS/CICS/VS-DOS	5746-XC4	100	52	31	
DMS/CICS/VS-OS AGF	5740-XC5	300			
DMS/CICS/VS-OS DOS AGF	5746-XC4	150	52	31	
NO SP	5735-XX2	95	30	18	125
NCCF	5735-XX6	65	35	21	100
NPDA	5735-XX8	32	18	11	50
DOS/VS/RJE Work Station Program	5746-RC9	75	(No Add'l Fee)		
VSE 3270 BSP	5746-RMS	100	(No Add'l Fee)		
VSE/Fast Copy	5746-AM4	300	(One-Time Fee)		
VSE/Ditto	5746-EP3	26	5	3	
VM/IPCS	5746-SA1	30	5	3	
Btam/ES	5746-RC5	20	5	3	
VSE/IBM System/3-3340	5746-AM3	1,200	(One-Time Fee)		
IPF-R1	5746-MS1	30	5	3	
Job Entry Program	5746-XE6	140	26	16	
File Transfer Program	5748-XE6	35	5	3	
Utility Office 3800	5748-VT2	47	13	8	60
SPPS-II	5735-D16	240	20	12	260
Video 370 CICS Feature	5736-RC3	155	69	41	224
		50	18	11	68
VSPC-OS/VS1	570-XR5	940	160	96	1,100
VSPC-DOS/VS	5746-XR3	760	140	84	900
Advanced Function 1 —DOS/VS	5746-XE2	150	50	30	
DB/DC Data Dictionary DOS/VS	5746-XXC	290	—	—	
DOS/VS Sort Merge V2	5746-SM-2	135	20	12	
DOS/VS RPG-II	5746-RG1	100	5	3	
DOS Fortran 4 Library Option	5746-LM3	33	5	3	
Fortran VSPC	5748-FO2	365	35	21	400
DOS/VS Cobol Compiler Library	5746-CB1	141	6	10	
DOS/VS Cobol Library	5746-LM4	28	5	3	
DOS/PL/I Optimizing Compiler	5736-5PL1	210	40	24	
DOS PI/I Resident Library	5736-LM4	45	5	3	
DOS PL/I Transient Library	5736-LM5	28	5	3	
DOS PL/I Optimizing Compiler Library	5736-P13	283	50	30	
VS BASIC	5748-XX1	370	15	9	385
VS APL	5748-APL	220	30	18	250
1401/1440/1460 Emulator	5746-SU1	100	5	3	

[1] For each additional processor within the same installation.
[2] Italicized figures are current program products.

By E. Drake Lundell Jr.
CW Staff

WHITE PLAINS, N.Y. — While first users will be paying a bundle for previously free software on the IBM 4300 systems, they will be paying even more as time goes on.

IBM has admitted — in a statement made to the investment community but never released to the press — that it will continue to take pieces out of the DOS/VSE System Control Program (SCP) and charge for them as program products.

In a rare "Directional Statement," IBM said "the DOS/VSE SCP with the VSE/Advanced Function program product is the base for the related program products.

"It is anticipated that future enhancements will only be made in the VSE program products and the SCP itself will not be enhanced. When SCP modules or macros are changed to support these program product enhancements, the changed modules and macros will be incorporated in the enhanced program products.

"The DOS/VSE SCP will, over time, contain a diminishing number of modules."

IBM has already started down this road with the initial DOS/VSE release. Previously under DOS/VS, Power/VS was free to users as part of the SCP, for example, but the update is now a program product that costs users $40/mo to rent and $12/mo for support.

In addition, dozens of other functions that were previously free now carry charges under the new system.

And, apparently, the situation will only get more expensive, according to the directional statement.

Emphasis Shifts To Deregulation

(Continued from Page 1)

without dominant market power and a further phasing out of the residual regulation over a fixed period of time," Geller said. "Congress should, insofar as possible, explicitly state in the legislation the results it wishes to obtain, rather than leave fundamental policy decisions to the discretion of the independent regulatory body."

The regulatory practices of the FCC have not been effective in the past, are not now effective and will not be in the future, he maintained. This does not mean the commission is "evil" or "inept"; the FCC staff is very competent and very well intentioned, but its task has just become too complex, he said.

In a similar vein, AT&T Chairman Charles L. Brown, whose testimony preceded Geller's, criticized the section of Hollings' bill which says, "Nothing in this [bill] shall be deemed in any way to affect the applicability of antitrust laws of the U.S. or the responsibilities of the Department of Justice, the Federal Trade Commission or the [FCC] to enforce such laws, as the law may provide."

"It seems to me only right that the reverse should hold: a carrier should be afforded transitional protection while competitive conditions develop and should not be penalized by what might very well be the free market's conclusions that the carrier is doing an outstanding job," Brown said.

Users May Pay a Lot More For IBM 4300 Software

(Continued from Page 1)

$6,069/mo and $248,760.

For the basic model of the 4331, then, the monthly software charges will be 125% of the hardware charges; the basic software will amount to 41% of the 4341's hardware price.

Multiplying the monthly software charges by 35 (the basic rental price is 1/35 of the purchase price on the hardware), the software will cost $73,955 for the 4331 users and $86,905 for the 4341 user over the purchase life of the machine.

This means that the 4331 user will pay 108% of the hardware price in software fees over three years and the 4341 user will pay 35% of the hardware purchase price over the same period for this basic software.

(In order to make this comparison simple, the increased power and therefore probably increased need for software on the 4341 was not considered. However, 4341 users will probably buy a greater range of program products than the relatively few listed here as a basic system.)

For a comparison for a more sophisticated communications-oriented system, the program products shown in Figure 2 were added to the base software. With these two sets of software, the 4331 user will be paying $3,444/mo in software fees and the 4341 user will be paying $3,814/mo.

This represents 205% of the hardware price on a monthly basis and 175% of the hardware price on a purchase basis for the 4341 user. For the 4331 user, the respective percentages are 63% and 54%.

'Sophisticated' 4300 Software

PROGRAM PRODUCT	MONTHLY LEASE	MONTHLY SUPPORT
VSE/Power RJE	$70	$17
ACF/VtamE	95	56
VSE/Interactive Computing and Control Facility	60	20
VSE/Access Control-Logging and Reporting (ACLR)	35	16
DMS/CICS/VS-OS-DOS AGF	150	52
Network Operator Support Program	95	30
Network Communication Control Facility	65	35
Network Problem Determination Aid	32	18
DOS/VS/RJE	75	None
Btam/ES	20	5
VS/Basic	370	15
Total	$1,067	$264

Figure 2

Victimized Bank Files Civil Suit Against Rifkin

By Tim Scannell
CW Staff

LOS ANGELES — The Security Pacific Bank here has filed a civil suit against computer consultant Stanley Mark Rifkin that asks for an unspecified amount in punitive damages as well as the recovery of any actual losses that might have occurred during his theft of $10.2 million from the bank last year.

Posted in Los Angeles Superior Court, the suit specifies as punitive damages any profit Rifkin might make from the sale of book or movie rights concerning the electronic theft.

Rifkin was sentenced last month to eight years in prison for stealing the money from the bank by manipulating the Federal Reserve's Fedwire system [CW, April 2]. He used approximately $8.1 million of the funds to purchase 19 pounds of diamonds from a Swiss broker.

Although the bank has recovered $1.9 million of the stolen money and the diamonds — estimated by the Federal Bureau of Investigation to have a retail value of $13 million, a Security Pacific spokesman claimed that the bank may still be missing some funds.

Saying that the diamonds are worth $13 million is "a conclusion not justified by the facts," according to Richard Warner. "The bank presently has the diamonds and they are being sorted, graded and appraised. We will have the results by the end of this month."

Warner also stated that Security Pacific is seeking damages from Coast Diamond Distributors, a local diamond merchant that helped Rifkin arrange the transcontinental jewel sale. According to Warner, Coast Diamond returned to Security Pacific $1,892,000 of the more than $2 million Rifkin paid for its services. The diamond merchant reportedly kept the remaining money as a fee for services performed without prior knowledge that the funds were stolen.

No date has been set for a hearing on the bank's civil action.

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Salesman Fired for 'Testing' Employer's Security

By Marguerite Zientara
CW Staff

NEW YORK — Although a Wall Street firm's DP system passed an employee's clandestine security "test" here, the tester wasn't so lucky. The caper resulted in his flunking out of his job and being barred from certain types of employment with any member of the New York Stock Exchange for up to three years.

Intended to demonstrate whether Donaldson, Lufkin & Jenrette Securities Corp.'s computer could trace false cash disbursements, the test was comprised of a series of bogus credit entries made into the system by former employee Gary S. McHam.

Then a salesman for the firm, McHam entered the false credits in March 1978 in connection with a term paper he was writing for a graduate course in business administration. He hoped the "test" results would cause improvements to be made in the Donaldson Lufkin system, he said.

The penalty was handed down two weeks ago by a New York Stock Exchange hearing panel that found McHam guilty of "engaging in conduct inconsistent with just and equitable principles of trade." No one at the firm had been aware of the planned test, the panel found.

The hearing panel barred McHam from employment in any capacity with any member organizations for one year and from employment in any supervisory capacity for three years, retroactive to March 23, 1978, the date he was discharged from Donaldson Lufkin.

Sequence of Events

"In preparation for the test," the hearing panel found, "McHam arranged for the filing of the necessary documentation to open accounts for four of his customers in a mutual funds tax exempt bond fund."

On the evening of March 14, 1978, McHam entered the keypunch area at Donaldson Lufkin and prepared four bogus credit slips totaling $1 million and put them in a batch ready for keypunching. After they were keypunched, McHam removed the slips from the stack.

The next morning, McHam had the firm's margin clerks try to transfer the funds credited to two of the customers to the bond fund, according to the hearing panel. While one of the attempts was successful, resulting in a $500,000 transfer of funds, McHam stopped the second when the margin clerk stated he was having problems making it.

Later that day, McHam contacted the fund and had the successful transfer annulled. All the illegal transfer activities became known to the firm the next day, March 15, and the firm canceled the four bogus credit entries.

The firm discovered the discrepancy "quite easily," according to a Donaldson Lufkin spokesman. With an overnight batch processing system, morning brought out the evidence.

Since there were no corresponding debits entered into the system, the spokesman explained, the books and records of the firm were thrown out of balance by $1 million, a condition that was "immediately discovered."

Apparent Discrepancy

While McHam maintained it was his intention to disclose the details of the test when it was completed, the Donaldson Lufkin spokesman said, the hearing panel found that "during the firm's investigation . . . McHam denied on several occasions any knowledge as to the source of the credit entries."

Furthermore, the hearing panel found, McHam suggested the entries may have been initiated by back office personnel "who, according to McHam, were hostile to him."

The hearing panel also found that McHam specifically denied to senior management that he was "testing" the firm's system. On the night of March 20, however, McHam telephoned his immediate superior and admitted his role in the transfers, the panel found. Three days later he was discharged.

A Question of Intentions

The Big Board did find that McHam's test was not "an attempt to abscond with firm funds nor to assist anyone else in such an enterprise, but were carried out for the purpose of his term paper."

When asked if he felt McHam's test indicated the need for greater security at Donaldson Lufkin, the firm's spokesman said that "perhaps some improvement could be made in terms of access to the keypunch area itself, but that would be all."

The spokesman went on to explain that at the time of the transgression, the company was in the midst of acquiring another firm and the two had merged their DP facilities. "Part of the problem at that time was that our people were in temporary quarters — a situation that we knew was not the best, but which was temporary. I believe that right now we have a totally secure facility."

The reason given for McHam's dismissal was a "serious breach of the firm's records. . . We just could not permit anybody to do something like that," the spokesman said. "Even if we were not a firm that is engaged in the care and custody of other people's property, I believe that we still would have been required to let him go."

While McHam did, in fact, cancel the funds transfers, showing he had no intent to achieve monetary gain from them, the spokesman said, "You can never know what a person's real intentions were."

McHam's Statement

McHam, who is presently employed at another Wall Street firm, issued the following statement on the matter:

"I am pleased that the exchange found that my sole motive in testing my former employer's information was to obtain material for a term paper in a graduate business school course which I was taking.

"Although I hoped that my test would result in improvements in the information system, I have regretted my actions for many months. However, I have paid dearly for my mistake and I now wish to put this incident behind me."

Avoid Those Long Lines — Preregister for NCC

By Marcy Rosenberg
CW Staff

NEW YORK — National Computer Conference time draws nigh — and if memories of last year's long registration lines still linger and haunt, take heart. Preregistration remains an alternative to the "grin-and-bear-it" approach.

By registering in advance, conference attendees "can avoid any line at all," according to Carol Sturgeon, manager of conference operations for the American Federation of Information Processing Societies (Afips), NCC's sponsoring organization.

Individuals who send preregistration forms to Afips before May 15 will be mailed badges, tickets and stubs for proceedings to allow immediate entry to the show, set for June 4-7 here.

Otherwise, those who register at the show must first spend time in a line to the cashier for a receipt and then queue up for the badge typist. Sturgeon estimated the average waiting time at last year's NCC in Anaheim, Calif. was one hour.

Besides gaining faster access to the conference, advance registration can save attendees $15 if they plan to sign up for all programs and exhibits for the entire four-day run.

Normally, full registration, including personal computing sessions and a copy of proceedings costs $75. Preregistrants pay $60. There are no discounts, however, for partial registration.

While the time savings and cost benefits of advance registration may seem too obvious to mention, too few people take advantage of the procedure, Sturgeon lamented. Out of 57,000 attendees at NCC '78, only 6,300 registered in advance.

Advance registration is open to everyone, including students and exhibitor guests who "often don't realize they can preregister by mailing exhibitor passes to Afips before the deadline," according to Lori Capodanno, a Bell Laboratories supervisor and operations chairman of the NCC '79 Steering Committee.

Persons wishing only to attend any or all of the 15 full-day Professional Development Seminars can also sign up before May 15, she noted. While preregistering brings no reduction in fees — $50 per session — it could assure a seat. Space constraints will limit the number of session participants to 120.

Capodanno recommended signing up in advance for all NCC events, even though some steps are planned to minimize at-show registration bottlenecks of previous years. These include:

- Setting up multiple registration sites — at the New York Coliseum, Hilton Hotel and Sheraton Center Hotel.
- Providing for registration at the Hilton on Sunday, June 3, from 4 p.m. to 8 p.m.
- Increasing from about 20 to 40 the number of terminals used to process badges.

Advance registration forms are included in "NCC '79 Preview" newsletters. They can also be obtained by phoning Afips at (201) 391-9810 or writing to NCC '79, c/o Afips, 210 Summit Ave., Montvale, N.J. 07645.

Property Worth $1 Billion Destroyed

Central U.S. DPers Mopping Up After Floods

By Brad Schultz
CW Staff

From North Dakota to Louisiana, DP users in the central U.S. are wringing out rags and rereading insurance policies in the wake of flooding that has reportedly destroyed $1 billion worth of property and forced the evacuation of thousands of homes and businesses in the past few weeks.

In the hardest hit areas — such as Grand Forks, N.D., and Jackson, Miss. — most users have experienced little physical damage to their installations, but only because many of them moved their equipment, jerry-rigged spare power sources or heaped sandbags around their computer rooms.

A small minority, however, suffered the ultimate in computing calamities: total devastation.

'A Lot More Drills'

Many users who escaped disruption of their DP operations will, nevertheless, hold "a lot more drills" to prepare for any future natural disasters, DP Director Roy H. Woody observed. The hospital whose system Woody manages was able to help other users in Mississippi's Hinds County because the rampaging Pearl River could not reach its hilltop summit.

For a few days, Jackson-based Hinds General Hospital ran tasks for less fortunate organizations on its 192K-byte Honeywell, Inc. 2048 mainframe with 240M bytes of disk storage. At one point, while the Pearl virtually besieged the hospital, Woody ordered valuable reels of magnetic tape to be transported in private automobiles on Jackson's safer streets.

Woody estimated he could clear out his system in four to six hours if the Pearl came his way. He now plans to introduce occasional evacuation drills for his DP staff and to develop strategies for possible emergencies.

In another part of Mississippi's capital, KLM, Inc., a trucking firm, evacuated its IBM System/34 and ringed its installation with sandbags. When power fluctuations began as the Pearl seeped into the local electric utility substation, DP Manager Jack Lyle halted CPU activities.

KLM had a small auxiliary power generator not linked to its computer system. A power blackout would thus have killed the data under manipulation at that time and badly harmed running software. Evacuation commenced soon after CPU activities were halted.

Within one and a half hours, the 64K-byte main memory/27M-byte disk system was removed. The CPU and printer went to the loading dock of a competing trucking firm, while the CRT terminals went to "a man's house," Lyle recalled. Despite "a few dings, brushes and scrapes here and there," no real damage was suffered.

After nine days in exile, the system was reassembled last week and is reportedly doing well, although the computer room "looks a little worse for wear."

Lyle said another System/34 user allowed KLM to run its tasks there during the emergency. KLM has now offered that firm the use of its facility should the tables ever be turned in the future.

Farther south, some users were better prepared for the flooding because they had been through similar experiences. Located near Louisiana's capital, Denham Springs on the Anite River was protected by levees erected after the Anite ravaged the town two years ago.

But Livingston State Bank, apparently Denham Spring's largest DP user, found a two-inch deep lagoon in its computer room, which has a recessed floor. Rainwater, rather than the Anite, broke into the bank, threatening to damage the cabling of a Burroughs Corp. 2800 computer system, according to Ann Shugart, the bank's DP manager.

Shugart had to keep the 2800 down last week and cut power to the computer room while the water was drained away.

Unlike the overflowing southern rivers, North Dakota's Red River did not threaten a large number of DP users by jumping its banks two weeks ago. But some installations in Grand Forks, N.D. — little more than 100 miles south of the Canadian border — encountered problems as the river inundated a large portion of the town.

The English Coulee, a tributary of the Red River that is normally a narrow stream, swept through some fraternity houses at the University of North Dakota in Grand Forks, according to Con Dietz, director of the campus computer center.

Dietz oversees an IBM 370/148 mainframe, a Digital Equipment Corp. PDP-12 and three PDP-8 microcomputers in a basement that at press time was about 200 yards from the English Coulee. Dietz was confident that his facility and the five remote job entry sites linked to it would fare better than the fraternity houses because the building sits on a hill.

However, the flooding has caused the local water table to rise so abruptly that leaks have started in the walls of his basement center. Underground water pressure is the center's main security risk at this point, he said.

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Internal Bell Nets: Stepping-Stone to ACS?

By Ronald A. Frank
CW Staff

The Bell Administrative Network Communications Systems (Bancs) are internal networks described by Bell System documents as handling "both interactive terminal/host processor traffic and store-and-forward output distribution traffic." A Bancs network is made up of modules which together form a data communications system,but the modules can also perform individual functions without being "building blocks to a larger system."

Bell Laboratories specifies Bancs product functions and performance, selects vendors, develops personnel subsystems, does some software development, helps Bell System operating companies engineer networks and coordinates maintenance, Bell documents state.

At least five Bancs modules are known to exist, and the system may have been upgraded with more. These modules include the Front-End Processor (FEP); Terminal-Handling Processor (THP); Remote Terminal Controller (RTC); an electronic mail system called the Report Forwarding System (RFS) and a substitute for IBM's Virtual Telecommunications Access Method (Vtam), the Data Network Access Method (Dnam).

FEP utilizes Comten, Inc. front ends and is said to replace IBM 270X and 370X processors running in emulation mode. FEP supports terminals not handled by IBM system software and requires no host software modifications.

FEP supports IBM's IMS and CICS host applications by replacing Vtam with Dnam. This module operates with an IBM 370 CPU, Comten 3650 or 3670 front end and IBM and Teletype Corp. terminals.

THP polls and controls terminals independently of the host CPU, which can be either an IBM 370 or a Univac 1100. The module uses a Control Data Corp. Cyber 1000 processor, and terminals include most Teletype models and the IBM 2740 Model 1.

THP provides for sharing of terminal inputs between "dispersed hosts," and it also interfaces with other Bancs modules. THP capabilities include line speed adjustments, I/O device control and monitoring, code translation, network loading control and the ability to support a variety of I/O devices, according to Bell documents.

RTC concentrates traffic in a remote network over a single or multiple lines with a THP. The RTC processor is a Data General Corp. Nova 3/12 "without secondary storage that is designed to function 24 hours per day." The RTC can handle from eight medium-speed to 128 low-speed communications lines; Teletype Corp. terminals are supported.

RFS is used for message storage and distribution. It accepts messages for storage, performs message "address interpretation" and sends messages back through the net for distribution. While the processor type is not specified, it reportedly is one suited for high-volume message traffic.

Dnam replaces IBM's Vtam and supports a THP terminal network by viewing the network "as a pair of IBM tape stations," the Bell documents said.

Bancs network protocol includes point-to-point, character-oriented, half duplex, binary synchronous and contention traffic modes. The physical level is described as RS-232C- and Bell 301-compatible. Applications include IBM IMS, CICS, and Bancs/FEP, which can stimulate an IBM System/7 processor.

In addition to IBM hosts, it is believed that some Bancs modules will operate with Amdahl Corp. mainframes.

In Trouble, AT&T Changes Strategies

(Continued from Page 1)

gional ACS-type network, the supplier said.

If Bell System network staffers are shopping for outside expertise, it may indicate that the operating companies are considering an upgrade of the internal Bancs network.

Bancs is an acronym for the Bell Administrative Network Communications Systems. It was developed by Bell Labs "to satisfy new operating telephone company needs and to permit migration to future network technologies," according to Bell System documents.

If Bancs is a steppingstone to other network technologies, in-house networks may be able to be upgraded with ACS functions for possible external tariffed offerings on a regional basis, some industry sources believe.

While little has been released by Bell concerning Bancs, it is known to support IBM hardware and teleprocessing software, as well as terminals from several non-Bell suppliers.

Bancs is not considered to be a data communications capability that utilizes the sophisticated features promised for ACS. However, it operates with Comten, Inc. front ends and supports both IBM and non-IBM as well as Bell System terminals.

Although other features of Bancs do not match the needs of ACS, an overbuild of the basic Bancs concept is a possibility, industry sources acknowledged.

And if ACS development does not proceed satisfactorily within the Bell System, it appears that AT&T is not beyond going to outside sources. Specifically, these sources are said to be at DEC, but Bell will not comment on whether the minicomputer supplier is involved in ACS development.

Despite this, several facts point to a tie between DEC and the phone company. It is known that DEC PDP-11/34 and PDP-11/70 processors will be used in the ACS network as nodal processors. And DEC has run help wanted ads for software specialists which specifically mentioned both Bancs and ACS software experience as a requirement.

In addition, DEC filed a strong supporting position paper with the FCC relating to AT&T's ACS proposal. The DEC position differed markedly from that of most other DP and data communications suppliers, who have expressed reservations about Bell using its monopoly power to enter the competitive data communications area.

While none of these facts offer conclusive evidence, it seems logical that DEC would attempt to secure its potential hardware sale with software development as well.

In addition, industry experts feel the company's Decnet architecture could be expanded to encompass ACS features.

While AT&T has not released much information about how ACS or similar services are being developed, most industry analysts feel it is unlikely Bell will abandon plans for such an offering until all its alternatives have been exhausted.

Itel Introduces OS Sort

(Continued from Page 1)

Another enhancement, utilizing microcode to perform the most heavily exercised instructions in the sort algorithms, should be ready by year-end. This microcode-assist is conceptually similar to Microfast, the product Itel announced recently [CW, March 12] to give IBM 370/145s processing power comparable to that of Model 148s, the spokesman explained.

Dynasort was developed by California-based Watson M. Connor, Inc. The Itel spokesman could not explain in detail how the sort works, but said its techniques for selecting merge strings reduces the quantity of data that has to be transferred between temporary workstation devices.

Channel activity is reduced because Dynasort requires "significantly fewer EXCPs," he said. In addition, the Conner/Itel utility does not use page fixing to minimize private CCW translation as most sorts do. This ensures more efficient system utilization.

Recognizing that the software in its present state cannot do everything, the developer provided coding so that if Dynasort encounters a function it cannot perform, it will automatically invoke the installation's standard sort. This transfer of control is completely transparent to the user, according to Itel.

Benchmark Results

Itel ran a series of benchmarks when Conner originally offered the company his sort. He claimed it was the fastest sort in the world, but Itel's Data Products Group wanted to see for itself.

Several test loads were devised and run against the three sort packages on the same equipment. In one test, Dynasort required only .53 seconds of SRB time, whereas Syncsort needed 1.01 seconds and the IBM sort ran for 2.10 seconds in the SRB.

EXCP counts followed the same pattern in that test, the Itel spokesman said. Dynasort required only 668 of these I/O operations, Syncsort needed 1,627 and IBM's 5740-SM1 went through 6,792 EXCPs before it was finished, Itel claimed.

In another of the benchmarks, SRB time was 5.57 seconds for Dynasort, 21.11 seconds for Syncsort and 11.06 seconds for the IBM utility. EXCP counts in this case were 10,673 for Dynasort, 22,689 for Syncsort and 17,985 for IBM's 5740-SM1.

Thus Dynasort "won" both of these exercises in terms of its consumption of SRB time and number of EXCPs, while Syncsort and IBM's Iceman traded places in the rankings from one test to the other.

Existing programs do not require alterations when Dynasort is implemented, Itel said. Like other sorts, Dynasort will utilize whatever space in main memory is allocated to it.

The package runs on IBM 360 and 370 and compatible CPUs capable of utilizing IBM's OS/360 or OS/VS.

Dynasort is available immediately at a monthly rental cost of $100. This figure will rise sharply once the variable-length record support and other features are ready for market, the spokesman acknowledged.

Itel is headquartered at One Embarcadero Center, San Francisco, Calif. 94111.

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To Avoid Use as Political Tool

City Council Opens Mini's Data Base to Public

By Tim Scannell
CW Staff

BOSTON — Concerned that a new minicomputer could eventually be used by this city's mayor as an extension of his political arm, the City Council here has passed an ordinance ensuring that all of the data contained in the system be made available to the public.

Initiated last month by City Councilman Lawrence DiCara and subsequently signed into law by Mayor Kevin H. White, the regulation closely parallels rules already laid down in the federal Freedom of Information Act (FOIA). In effect, the order seeks to block White and other city officials from using the personnel — and workload-tracking computer as a private data base.

"If we're going to have information that the people have paid to accumulate, then it should be available [to those people] and to those who govern," City Councilman DiCara stated. "This is a city where we have two branches of government — executive and legislative — and Kevin White has to share that information, because information is power."

Mainly, it's "just to make absolutely clear what the city's intentions are and what its use [of the computer] will be from the outset," a member of DiCara's staff added.

More Regulation Unnecessary?

Jerry Mechling, White's director of management and budget, disagrees with the City Council's stand, however, and contends that the council's actions are, for the most part, unnecessary, since FOIA guidelines permit public scrutiny of any city-related business or information.

"These issues have been addressed by federal legislation and by state legislation, and we welcome any local legislation because we're concerned about those things," Mechling said. But, "those are not really the issues that are of great concern to [the City Council]."

The computer involved in this political tug-of-war is a Digital Equipment Corp. PDP-11/70 designed to keep track of citizen requests for service from the city; to monitor how fast these requests are answered; and to pinpoint which particular departments are responsible for providing satisfaction. The computer also will keep tabs on city employee promotions and appointments, checking to make sure that any in-house shuffling complies with state civil service restrictions.

Headlands Management Co., a San Francisco firm specializing in governmental computerization, will install the administrative computer and expects the system to be fully operational by the end of next month. The West Coast company has already implemented a similar computer system in San Francisco and constructed an automated site at the Department of Housing and Urban Development in Washington, D.C., that tracks correspondence between that agency and Congress.

Accusations of Electioneering

According to Mechling, the City Council has attacked the as yet inoperable computer system to gain personal recognition in an election year. "The City Council's problem, if you look at each individual councilman, is that they run at large against each other . . . in an election where people don't care a great deal who's elected," Mechling observed. Therefore, "name recognition becomes virtually the dominant factor."

Driven by this need for recognition, the City Council will "almost always take a posture of extreme opposition to anything that a mayor proposes," Mechling continued. "And that explains about 80% to 85% of what goes on."

The management and budget director did admit, however, that the machine and its use could, in a sense, be considered a political tool.

Through the administrative powers of the computer, Bostonians will "appreciate the services more, be a little less upset about waste in government and perhaps a little more positive [sic] to the fact that it's a crazy bureaucracy, but we're trying to get it to work," Mechling noted.

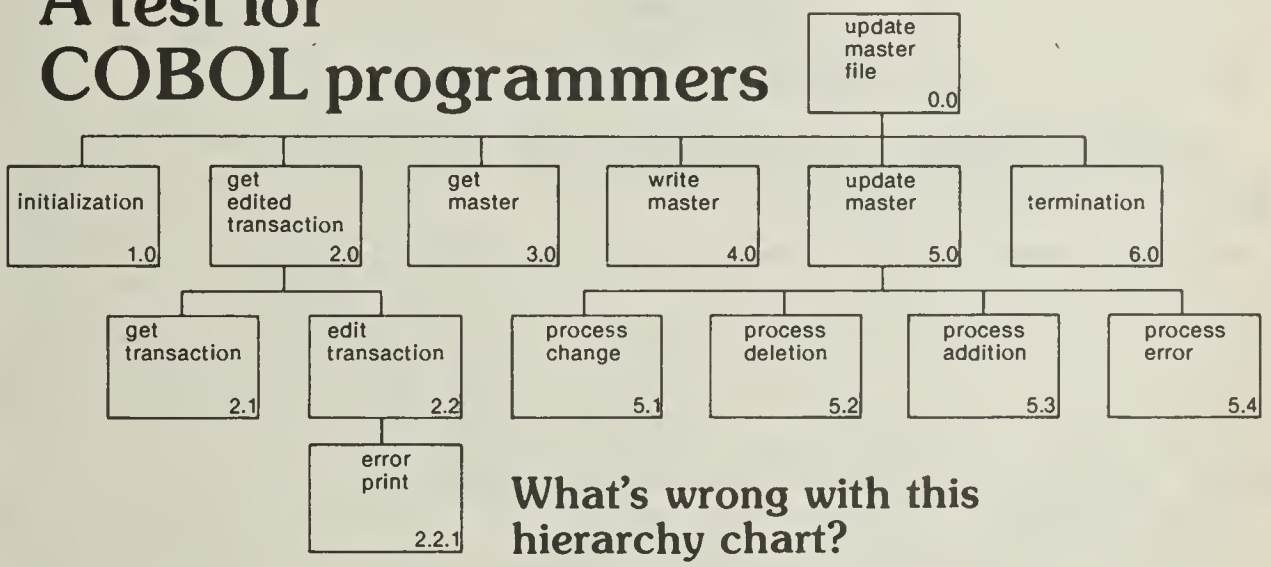
Both Headland's President Thomas J. Hargadon and Vice-President Chauncey Bell stressed Boston's need for such a computer system, particularly in the potentially confusing area of civil service employment. "Because it's civil service, people can have a permanent position and then be provisionally appointed, appointed or promoted to another position. Then again somebody can be temporarily put in a position to which someone else is permanently assigned, but currently placed elsewhere," Bell commented.

Since 1939, Boston has maintained its personnel — and workload-management file on a series of 4-in. by 6-in. cards, Hargadon added, pointing out that this is the beginning of a "professional personnel function for the city."

System security will be provided by a password-type hierarchy, with access limited to specific files and information retrieval dependent on certain procedures. "Just because you have a

(Continued on Page 10)

A test for COBOL programmers



What's wrong with this hierarchy chart?

Many things. The numbering system is inefficient (2.0, 2.1, 2.2.1, etc.). Modules 1.0 and 6.0 aren't functional (they are carryovers from unstructured thinking). The module names are inconsistent and imprecise (what's the difference between "error print" and "process error"?). But these are the least of the problems.

What's really wrong with this chart is you can't code a decent COBOL program from it. Why? Because the modules don't have the proper relationships to each other. In particular, modules 2.0, 3.0, and 4.0 should be subordinate to module 5.0. Then, module 0.0 can perform module 5.0 until all records are processed. And module 5.0 can get transactions, get masters, and write masters whenever needed.

Oh sure, there are ways you could make this chart work. You could code a two-paragraph section for module 0.0 and have the first paragraph perform the second one until all records are processed. Or, you could make modules 2.0, 3.0, and 4.0 subordinate to both modules 0.0 and 5.0. Either way, though, you end up with a sloppy programming product...and you defeat the principles of structured design and structured programming.

A better method of design

If you'd like to learn a better way to develop hierarchy (or structure) charts, I'd like to recommend a couple of books to you. Both were written specifically for the experienced COBOL programmer by Paul Noll. Paul is one of the leading COBOL experts in the country, and he has some unique ideas about program design.

In the first book, *Structured Programming for the COBOL Programmer*, Paul shows you how to create a structure chart that will be an efficient guide to your COBOL coding. You'll learn the four steps for creating structure charts...what modules should go at what level...how to create functional module names that tie in to the paragraph names of the COBOL program...how to number the modules so the numbers can become part of the COBOL paragraph names...what to watch for when reviewing a structure chart...and much more. As a bonus, this book also covers structured coding, top-down testing, and structured walkthroughs...so you can see how the effectiveness of these techniques depends upon the strength of the structure chart.

The second book, *The Structured Programming Cookbook*, is a tool kit for the development of structured COBOL programs. It gives standards and guidelines for program development, so it becomes an instant standards manual for a structured COBOL shop. And it gives complete design, documentation, and code for four different types of business programs. As a result, this book can have a major effect on programmer productivity because it helps stop program re-invention.

If you are already using structured design and structured programming, I'm convinced that Paul's books will help you to improve your methods...and your results. On the other hand, if you haven't yet been introduced to these productivity techniques, you've got some exciting reading ahead of you. I think you'll find that these are the only books you will ever need if you decide to implement the new techniques in your shop.

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Too Many Options May Spoil Word Processing

SAN FRANCISCO — More is not necessarily better in the word processing game.

"Defensive buying" — the notion that a company cannot afford to do without all the latest available equipment options — leads many firms to purchase the wrong equipment, Lexitron Corp. President Richard O. Baily told a meeting of the American Institute of Industrial Engineers here recently.

Worse, Baily said, these option-laden machines usually carry higher price tags and, because they befuddle their operators, often cause lower office productivity.

The determination of equipment buyers to get the best value for their dollar is understandable, Baily said, but such zeal tends to create an all-purpose machine that exists only in the mind of the buyer — a machine Baily facetiously calls "the dreaded phantom text processor."

Such a text processor is the creation of buyers who try to sort through the bewildering maze of machines in hopes of making an apples-for-apples comparison of equipment, Baily said. These buyers gather every brochure and specification sheet published by word processing manufacturers.

They pore over each list and compile a new list of every available feature from every manufacturer. They then issue a spec for a text processor that includes them all.

Buyers Out of Luck

"Unfortunately," Baily said, "no such machine exists. When a buyer solicits bids on the phantom text processor, he finds that no manufacturer can supply a responsive bid, much less the specified machine."

Word processing manufacturers will go to extraordinary lengths to submit a responsive bid, Baily said, especially if the order is large enough. Often that means they will patch the software, add pushbuttons or invent complicated sequences that allow them to meet the requirements.

For example, buyers are currently specifying dual-sided floppy disks. But the disks are not yet reliable or even available, Baily noted. Consequently, word processing equipment using dual-sided floppies is not on the market and won't be until the reliability of the disks is established.

'Gee Whiz Features'

Buyers are as attracted to "gee whiz" features as to "gee whiz" technology, Baily said. For example, one Lexitron customer insisted on a feature called a widow-orphan control. The feature, which prevents a single line from being printed at the top of a following page, is quite useful on multipage documents. However, this customer's total word processing workload involved one-page sales letters and customer correspondence.

Growth capability is another concern of buyers, and they sometimes suffer a heavy penalty because of it. One Lexitron customer insisted on a shared printer capability — at a 40% premium — even though he was buying only a single text processor. Three years later his workload still requires only the single machine.

The worst drawback of the phantom text processor is its lack of usability, Baily said. As manufacturers work to supply the unsuppliable machine, a few hybrids with force-fitted features will be delivered.

What results, he noted, is a "Rube Goldberg device" that meets the specs, but places inordinate demands on the operator and might well decrease productivity.

The more difficult a text processor is to operate, the less useful it is in the office — and that, rather than the unnecessary costs and silly feature conflicts, is the primary reason why the phantom text processor is not the solution to the dilemma facing today's buyer, Baily said.

Purchase Guidelines

Baily offered these guidelines for buyers entering the maze of word processing options:

- Analyze your operations carefully. "Rather than trying to select the 'best' text processor and then fitting it to your operation, define your real needs in some detail and *then* look for the system that most closely satisfies those needs," he said.
- Meet today's needs first. "Don't be overly concerned with buying a system to meet all your growth needs for the next 10 years," he suggested.
- Don't overbuy.
- Consider human requirements. If typists can't operate the equipment, it won't work productively.
- Consider additions rather than replacements. Many features required for effective operation are probably available on the present equipment.

Data Base Open To Bostonians

(Continued from Page 9)

password doesn't give you access to all levels of the thing," the Headland president said.

Bell pointed out that any computer or information storage device, when put into a political environment, has the potential to be used to further political careers.

"The argument that information can be used for political purposes is unassailable," Bell said. "Any information about what people have asked for or what employees are doing is potentially politically valuable. On the other hand, it's impossible to manage the city without that information."

Meanwhile, cognizant of the City Council's concern over the system, Mechling has set up an executive committee to investigate similar computers in other governmental settings to see what can be learned about safeguarding the guarantees of open-file policies and public awareness. He believes, however, that the pros of the system far outweigh any potential cons.

"One of the reasons we have been inconsistent in the past about following through when we have said we will take care of a problem that comes up is that we institutionally lose touch with the fact that we have promised." With luck, the computer will help to remind the various city departments of their commitments, Mechling said.

In Response to Computer Crime

Cal State to Offer Master's in DP Auditing

By Jeffry Beeler
CW West Coast Bureau

POMONA, Calif. — Concern about the growing threat of computer crime has prompted a local university's Information Systems Department to propose the creation of perhaps the first formal degree program in DP auditing in the U.S.

Currently in the planning stage, the program at California State Polytechnic University will consist of a one- to two-year course of study leading to a master of science degree, according to Frederick Gallegos, a part-time instructor in the school's Information Systems Department.

Slated to begin this fall, the program will differ from more traditional DP auditing courses primarily in the comprehensiveness of its subject matter, said Gallegos, who also serves as a management analyst at the U.S. General Accounting Office's nearby Los Angeles branch.

Undeserved Inattention

In the past, Gallegos noted, DP auditing instruction received much less attention in computing and academic circles than it deserved. A few formal attempts to teach the subject evolved, but most of these efforts were geared primarily to individuals with strong professional DP backgrounds, not to computing novices.

A typical "program" of DP auditing instruction consisted of either a "crash course" seminar sponsored by a computer-oriented professional society or a few incidental college courses within a larger computer science curriculum.

The Cal State effort, by contrast, will treat DP auditing as a discipline in its own right and will explore the subject in greater breadth and detail than previous programs have, Gallegos predicted.

Courses offered in the curriculum will cover the full gamut of DP auditing topics, from basic concepts to the most specialized areas of professional concern.

As a result, the program is expected to appeal to a wide range of candidates, from seasoned computing professionals to individuals with minimal experience in DP.

many of the 50 or so students expected to enroll in the program this fall will be generalists. Business managers who have recognized the need to improve control over their computer system operations in particular should find the program useful.

Other enrollees will come from more specialized disciplines like accounting and DP management, where the need and desire for continued professional development seldom ceases.

The program will also attract systems analysts, programmers and other experts interested in pursuing alternate career paths, Gallegos said.

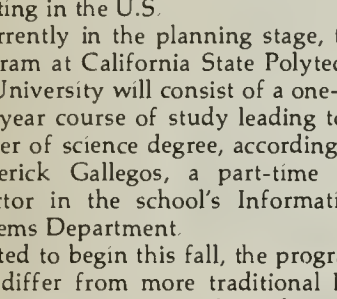
Choices Offered

As currently envisioned by Gallegos and Information Systems Department Chairman Dr. Thomas Athey, the curriculum will offer a choice of 16 courses in subjects like computer security and privacy, business economics, cost accounting and budgeting and the legal issues in DP auditing.

Requirements for a master's degree in the program will vary with a person's educational background. Individuals who demonstrate a strong grounding in accounting, computer science, business administration and other pertinent fields can earn a degree with as few as four "core" courses and two electives for a total of 24 credit hours.

Candidates with weaker backgrounds must earn 45 credit hours, including eight core courses and two electives. Moreover, they must successfully complete five courses in intermediate accounting, data management concepts and systems design before entering the program.

More information about the master's degree curriculum in DP auditing is available from Athey or Gallegos at the Information Systems Department, California State Polytechnic University, 3801 W. Temple Ave., Pomona, Calif. 91768.



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00051  000051  PROCEDURE DIVISION.
00052  000052  BEGIN.
00053  000053          OPEN INPUT DATA-FILE, OUTPUT LIST-FILE.
00054  000054          PERFORM LOOP-IT UNTIL EOFSW = 'X'.
00055  000055          PERFORM LIST-DONE.
00056  000056          GOBACK.
00058  000058  LOOP-IT SECTION.
00059  000059          READ DATA-FILE AT END
00060  000060              MOVE 'X' TO EOFSW GO TO LOOP-IT-EXIT
00061  000061          ADD 1 TO REC-COUNT.
00062  000062          COMPUTE AVG = YTOT-TOT / REC-COUNT.
00063  000063          IF REC-TYPE = 'A'
00064  000064              MOVE 'OUR' TO OUT-TYPE,
00065  000065          ELSE
00066  000066              IF REC-TYPE NOT = 'X' OR 'Y'
00067  000067                  MOVE 'ICC' TO OUT-TYPE.
00068  000068              ELSE
00069  000069                  IF REC-TYPE = 'C'
00070  000070                      MOVE 'ADM' TO OUT-TYPE,
00071  000071                  ELSE
00072  000072                      MOVE 'UNK' TO OUT-TYPE.
00073  000073          PERFORM YTOT-CALC.
00074  000074          ADD YTOT TO YTOT-TOT.
00075  000075          MOVE CORRESPONDING DATA-REC TO LIST-REC.
00076  000076          WRITE LIST-REC AFTER POSITIONING 1.

00078  000078  LOOP-IT-EXIT.  EXIT.
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Federal Information Institute Scheduled for May 21-22

WASHINGTON, D.C. — Trends and new programs in federal information will be covered in the third annual Institute on Federal Information, which will be held May 21-22.

The program will include lectures on such topics as "Developing a Framework for National Information Policies," "The 1980 Census Data Base: New Approaches for Availability" and "Machine-Readable Files: Standards for Cataloging."

The institute is designed as an opportunity for users of federal information, such as librarians, data base users, publishers, editors and information specialists, to hear speakers on federal information policies.

Registration costs $135. More information is available from Melinda Beard or Lowell Hattery at Federal Information Institute, College of Public Affairs, American University, Washington, D.C. 20016.

'Office of Future' Seminars Set in New York, Houston

NEW YORK — A pair of three-day workshops to train executives or office automation teams to purchase and implement cost-effective advanced systems will be held next month here and in Houston.

The series, called "Office of the Future Workshops," is meant to provide specific procedures for setting corporate goals and getting the most from equipment vendors.

It will be led by Dr. James H. Carlisle, a consultant to AT&T, Chase Manhattan Bank, Fiat Automotive, IBM and the U.S. Department of Transportation. "We're interested in building more informed consumers," Carlisle said. "We'd like to make project teams aware that they can demand and extract high performance from vendors."

The workshop is scheduled May 9-11 in New York and May 14-16 in Houston.

Further information is available from Office of the Future, Inc., The Galaxy, 7002 Blvd. E., Guttenberg, N.J. 07093.

Office Conference Planned

ATLANTA — Industry specialists in office automation recently took part in a roundtable planning session here for next year's first National Computer Conference Office Automation Conference and announced five areas to be covered there.

The conference, slated for March 3-5 in Atlanta, will feature sessions in data processing, word processing, communications, reprographics and records management.

Conference chairman Floyd O. Harris said attention would be given to cost-effectiveness, automation incentives, automated systems development and implementation time factors.

The conference is to be patterned after NCC, with meetings and an exhibit.

Symposia Slated On Both Coasts On Automation

PALO ALTO, Calif. — The Second Annual Symposium on the Automated Office, a two-day seminar, will be held June 13-14 and June 20-21 in Palo Alto, Calif., and in New York City, respectively.

The symposium, sponsored by The Yankee Group, will analyze sophisticated office systems and explore what might be available in the near future, according to a spokesman.

It will offer specific information, based on primary research and leading-edge user case histories, that will enable the user to begin integrating office information systems through a total systems approach.

Further information on the seminar is available from The Yankee Group, Harvard Sq. P.O. Box 43, Cambridge, Mass. 02138.

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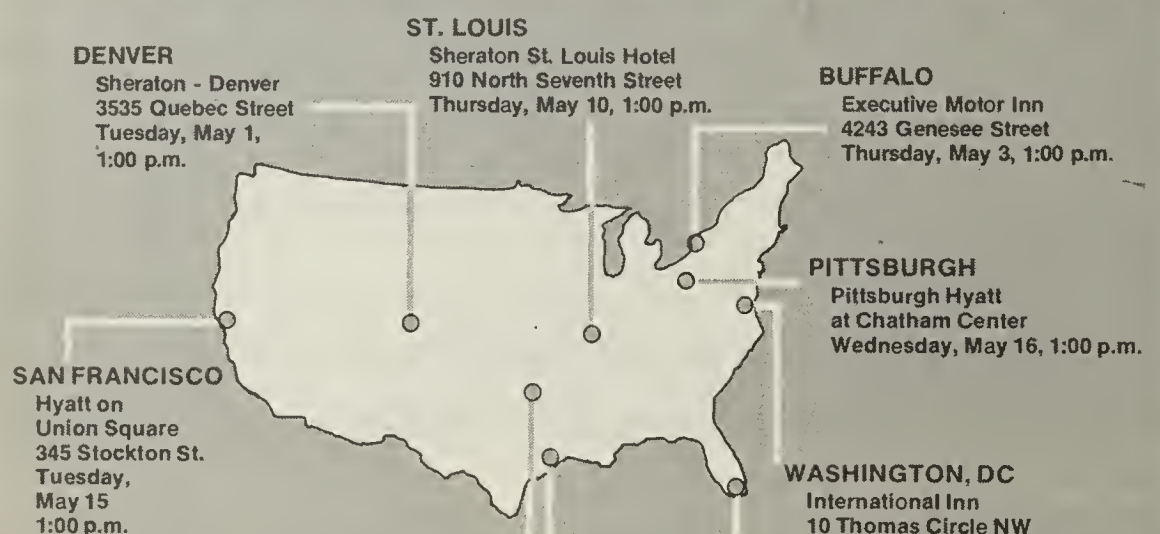

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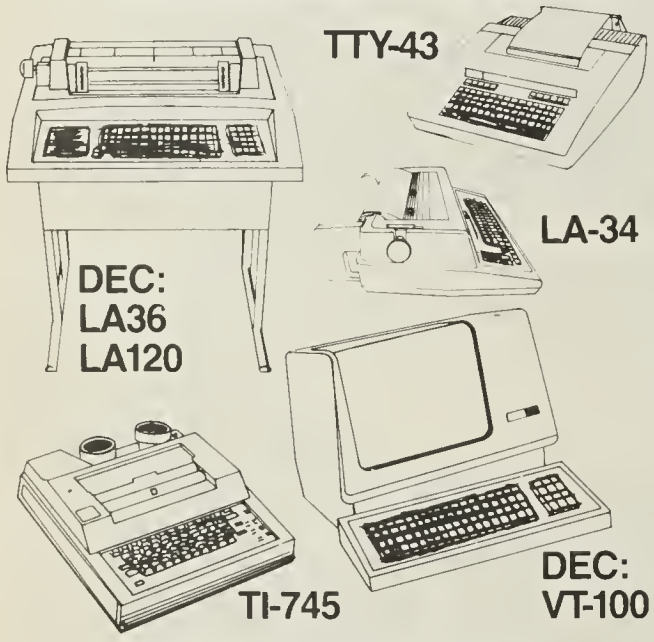

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Possible Burial Shroud of Jesus Undergoing DP Based Analysis

By Jeffry Beeler
CW West Coast Bureau

PASADENA, Calif. — A 14-foot sheet of ancient linen that some believe to be the burial shroud of Jesus Christ is undergoing long distance computer analysis here as part of an effort to unravel mysteries that have surrounded the cloth for centuries.

Aided by a 1.5M-byte IBM 360/65 at the National Aeronautics and Space Administration's (NASA) Jet Propulsion Laboratory (JPL) here, investigators are slowly evaluating data gathered last fall during a five-day scientific expedition to Italy, where the fabled Shroud of Turin was subjected to a battery of sophisticated photographic and spectrographic tests.

Because the researchers are pursuing the project in their spare time and largely with their own money, their investigation has shown only modest progress thus far. JPL scientist Donald Lynn expects interpretation of the shroud data to continue for at least another two years.

When final test results do become available, investigators here and elsewhere in the U.S. hope to shed new light on the unanswered question of how the centuries-old cloth acquired the faint image of what appears to be a 5-foot-7-inch bearded man.

They also hope their research will give new insights into the composition of the apparent blood stains that mark the figure's wrists, ankles, side and scalp.

Identity Not Conclusive

No amount of scientific testing, no matter how rigorous, could ever conclusively establish the cloth as Christ's burial shroud because researchers have no sure means of proving the identity of the individual who apparently lay beneath the linen. But with computerized image analysis, scientists can examine the shroud in minute detail and with a precision that was impossible for previous generations of investigators.

Thus, if researchers uncovered no evidence that contradicts the shroud's legendary origins, their findings will probably discount the possibility of a forgery and lend credence to claims that the cloth is authentic.

Investigators plan to use the local 360/65, which operates in the JPL's image processing laboratory, to enhance photographed sections of the shroud and to analyze its ultraviolet, infrared and X-ray characteristics, said Lynn, who heads scientific operations here for the Voyager space mission.

Lynn, a former supervisor in the JPL's image processing lab, hopes that computerized multispectral analyses will help settle the long-standing dispute about which shroud feature came first — the human likeness or the apparent blood stains.

If the controversial cloth is indeed a burial shroud, investigators would expect the blood stains to have formed first and the body outline later, Lynn thoeorized. Using computerized image analysis, researchers can tell if the shroud's markings are consistent with this hypothesis by determining whether the blood stains overlap the "human" figure, or vice versa.

Depending on their findings, the scientists could then either declare the cloth a fraud or certify it as possibly genuine, the JPL scientist said.

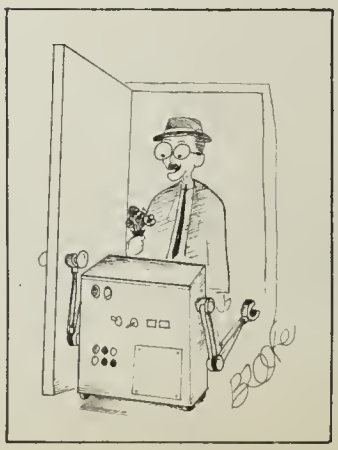
Blood Flow Characteristics

Lynn also hopes computerized image analysis will help dispel doubts about whether the shroud's apparent blood stains were in fact produced by open wounds or by some other means.

Using the results of the 360/65s multispectral analyses, investigators can precisely describe the densities, leading-edge features and other flow characteristics of the substance that caused the shroud's numerous dark blotches. They will then relay their findings to pathologists, who will try to decide whether the flow characteristics observed on the shroud match the known flow characteristics of blood, Lynn explained.

In other facets of the ongoing investigation, scientists plan to use the JPL's processor to enhance recent photographs of the shroud to determine if small, nearly perfect circles are visible over each of the human figure's eyes.

If such round impressions do exist, as some observers have claimed, they would provide strong evidence that the figure on the shroud lived and died in Palestine sometime during the first century A.D., when coins were sometimes placed over the eyes of the deceased.



'Hello, You Must Be My Computer Date.'

Manual Describes How To Hunt Down DP Crime

MADISON, Wis. — The *Computer Crime Investigation Manual* covers every vital area of computer crime and its investigation, the publisher, *Assets Protection*, claimed.

Author Tim A. Schabeck is contributing editor of *Assets Protection*, a security and investigation journal. Schabeck's experience includes more than 13 years in the field of DP with four years of computer criminal investigative background, the publisher said.

The manual is meant to give the professional "investigative knowledge and resources ranging from computer operations to forensics and investigative writing," according to *Assets Protection*.

It includes an extensive threat evaluation reference table for studying the causes and effects of computer system threats.

The manual costs $100. As an option, "The *Manual Update Service*," for $50 a year, was designed as an ongoing information course, reporting on developments in computer crime. Further information is available from *Assets Protection* at P.O. Box 5327, Madison, Wis. 53705.

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Big League Scouts 'Play Ball' With Service Firm

By Jay Woodruff
CW Staff

NEWPORT BEACH, Calif. — Baseball has changed, going the way of whirlpool baths, free agents and multimillion dollar contracts.

Even scouting for players has changed. Although scouts still must journey to the hinterlands in search of talent, most of them are reporting their findings to a computer.

Faced with rapidly escalating costs, major league teams are trying to save money wherever they can without compromising their competitive edge. One way 17 of the 26 big league teams get more scouting done for less money is by using the Major League Scouting Bureau (MLSB).

The bureau here is run by former major league pitcher Jim Wilson, who employs 60 scouts, most of whom once worked for the teams that now subscribe to the scouting service.

Wilson, who pitched for the Boston Red Sox, the Braves (he accompanied them when they moved to Milwaukee) and the White Sox before retiring in 1958, said that "scouting techniques and reporting by the scouts themselves are not really different, but this is much cheaper."

"For the amount of money that each ball club pays us per year, they would be able, probably, to hire only four scouts of their own," the former hurler explained.

Scouts Write Reports

Scouts from five regions attend games of high school, college and minor league teams during their playing seasons. On a standardized report form, the scout indicates the player's vital statistics including his name, phone number, address, weight, height and the number of games and innings that he was observed. Beyond that, the scout evaluates the player's baseball skills in five categories, using a rating system of two through eight — eight being the highest score for the particular skill being measured.

Once he enters scores for hitting ability, throwing accurately, fielding, range, baseball instinct and other parameters outlining the player's skill, he can then enter comments on physical characteristics, abilities, weaknesses and a summary.

Finally, the scout determines how much money he thinks the player is worth and what he thinks it might take to sign him.

The report is then sent to MLSB, where it is entered off-line onto a cassette, then dumped on-line into the Honeywell, Inc. Datanetwork service headquartered in Minneapolis.

Client teams, using either CRT terminals or Teletypes, dial into Honeywell's large-scale 6080 three-processor system, with 750K words of memory and 2M words of storage capacity. They request player profiles from it by name, position, location or ranking, Wilson said.

"Our scouts try to get around the country early," he remarked. "Right now, we're in the middle of the busiest time of the year; we're putting an average of 35 reports a day into the computer."

Clubs can order "pref" listings that rank players from all over the country into a preferential order or get lists by specifying a playing position, as well as ordering a wide variety of other reports.

Minor league teams generate the most extensive reports on their players for their parent clubs, assessing 23 aspects of each player's performance. The reports are printed and arranged according to the farm system to which the players belong.

Only those players in a particular farm system are profiled for the parent club. Passwords and other identifiers are used to limit the access to specific teams for information on individual pro system players.

'Signability Report'

Just before the June draft, the bureau makes available a "signability report," which reveals the scouts' assessments of a player's worth and what it may take to sign him.

Datanetwork's dial-in access and simplified procedures make it easier for nontechnical users to process all this information. "Relying on Honeywell's service allows us to work with the information without installing a complete computer system and then spending a lot of time learning how to use it," Wilson noted.

The computer has done more than save money for subscribing clubs, he indicated. For one thing, all bureau scouts now follow the same rating system.

Scouts from teams that still field their own national scouting networks travel about 40,000 miles a year, he estimated, while scouts from MLSB cover about half that distance, allowing them to view their area more thoroughly.

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April 30, 1979

CONCERNED OBSERVERS ASK,

IS THERE NO END IN SIGHT?

Top LSI Staffers Declare, "There's No Stopping Us Now!" *Page 16*

★ ★ ★

LSI Peripherals Multiplying in Captivity *Page 25*

★ ★ ★

Industry Pundits Ponder, "How Does LSI Do It?" *Page 80*

★ ★ ★

LSI One of Few Computer Companies With a Terminal Base *Page 32*

★ ★ ★

LSI Gift Certificates— Perfect Labor Day Gifts *Page 19*

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Unconfirmed Rumors Hint at LSI *Project Y* *Page 30*

Declassified photo of terminal production line at LSI, churning out a proverbial deluge of computer peripherals. Rumors that increased terminal production is already forcing valuable employees out of the building are thus far unconfirmed. INFORMER PHOTO

Lear Siegler / Data Products, originators of the mind-boggling Project X, is hot on the heels of its record backlogs, INFORMER sources learned early today.

Having acquired a staggeringly huge new 116,000 sq. ft. building in Anaheim, Lear Siegler's total floor space is close to a quarter of a million sq. ft. The division is indeed rapidly gearing up, according to our ingeniously placed INFORMER operative. That means Lear Siegler's wonder devices, known as Project X, will be pouring out of the new facility in veritable tidal waves.

But is that all it means? Official INFORMER opinion is: no. Persistent rumors of a mysterious new Project Y abound. And the INFORMER is tirelessly bounding after them.

What could Lear Siegler, already offering a broad product line and one-stop shopping, be concealing in the massive new building? Are they attempting to increase their 4,000 terminals-a-month average and achieve the 100,000 mark even sooner?

The possibilities are virtually endless and speculation is rampant, especially at the INFORMER. Consider the intriguing Project Y, for example. Could the builders of the renowned Dumb Terminal® terminal be attempting to surpass its already legendary Project X? Such a thought causes the mind to reel. But if anyone could pull such a coup, it would be Lear Siegler—a company that uses a simple terminal design and one logic board concept for simplicity, reliability, low-cost, and easy repair in the field.

What, then, might Project Y be? If Lear Siegler intends to introduce something new, then it must truly be brain-jolting. For, on the heels of Project X, nothing less than stupendous would suffice, a fact that is by now clear to serious students of Lear Siegler's successes.

There is one particularly tantalizing rumor that is rearing its head frequently. Could LSI actu-

(Please turn to page 5, column 3)

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Computer Expo '79 Gives Look at Latest Offerings

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — West Coast users got their first close up look at many of the DP industry's latest offerings as the 1979 edition of Computer Expo pulled into town for the fourth leg of a two-and-a-half-month tour that is taking it to nine major U.S. cities.

Although few if any of the approximately 50 participating exhibitors used the show as a vehicle for formal product announcements, many of the vendors displayed wares not more than a week or two old.

In some instances, products came to the show floor of the Computer Expo (formerly the Computer Caravan) directly from their debut at the previous week's Interface '79 conference. In other cases, the exhibition marked the first time products had been publicly shown following their formal introductions.

Either way, the show gave many local users their first "hands-on" experience with products they previously had only heard or read about.

Beyond the exhibit floor, meanwhile, 11 two-hour briefing sessions gave attendees a chance to explore some of the industry's hottest technical and policy issues with experts representing a wide array of computing disciplines and product areas.

Like the conference sessions, the Computer Expo show floor offered a broad cross-section of current computing products and services. Although printers and CRT terminals dominated the exhibition, they by no means accounted for all the show's hardware booths.

Other products in evidence at Computer Expo included data base management software, magnetic storage media, desktop processors, word processing hardware and hand-held data entry terminals.

Terminal Demonstrated

In the terminal area, Informer, Inc. demonstrated a modified version of its D384 which incorporates enhanced software that allows the product to emulate the Digital Equipment Corp. VT-52 terminal. Despite the added features, the cost of the D384, which was formally introduced about two weeks ago, remains unchanged: $995 each for 18 or more and $1,395 each for one to nine.

Though functionally identical to the VT-52, the D384 fits in a smaller box than its DEC counterpart and is packaged to harmonize with typical business office decor, an Informer spokesman claimed.

Another potentially important terminal shown at the Computer Expo exhibit was AT&T's Dataspeed 4540 synchronous communications terminal. Introduced the week before at Interface '79 (see Page 33), the 4540 represents an upgrade of Bell's 40/4 communications terminal and controls up to 32 on-line peripherals at speeds ranging from 2,400-to 9,600 bit/sec.

In the desktop computer area, Hewlett-Packard Co. led the way with the 9845B, an upgraded version of its 9845A. Formally announced on April 1, the 9845B incorporates up to 450K bytes of main memory compared with its predecessor's 64K bytes.

Despite its more than eightfold boost in central storage capacity, the latest HP desktop model costs $22,500, only $2,500 more than its sister system.

Among the printer vendors, Paradyne Corp. showed its freshly introduced Model 8351, a 2,000 line/min unit, while General Electric Co. demonstrated its Terminet 340 correspondence printer, which the firm announced at Interface '79.

The Model 8351 reportedly provides control positions similar to those on the IBM 1403 and sells for $65,000 or leases for $2,100/mo under a three-year contract. The 340, meanwhile, generates typewriter-quality output at 340 line/min and comes with a ribbon cartridge whose operational life exceeds one million characters.

Elsewhere on the show floor, two modem makers — General Datacomm Industries, Inc. and Codex Corp. — demonstrated two recent introductions to their respective product lines. Both the General Datacomm 208 B/A, a 4,800 bit/sec modem, and the Codex MX 2400, a series of 2,400 bit/sec modems, originally appeared at the latest Interface show.

Baruch to Speak At NBS Meeting

GAITHERSBURG, Md. — Dr. Jordan J. Baruch will deliver the keynote address at the 18th Annual Technical Symposium to be held here at the National Bureau of Standards (NBS) June 21.

Baruch, assistant secretary of Commerce for science and technology, will discuss "The Computer System Designer — Epistemologist of Industry."

The symposium is jointly sponsored by the Association of Computing Machinery's Washington, D.C. chapter and the NBS.

The full-day meeting, which includes lunch, will cost $25 to $35, depending on the registrant's affiliation and time of payment. Students may register for either $10 or $15.

More information is available from Philip A. Turner, U.S.D.A. Technical Information Systems, Fifth Floor, National Agricultural Library Building, Beltsville, Md. 20705.

Work in Bibliography Brings Honors to Park

ATHENS, Ga. — For the first time in its 15-year history, the Association of Information and Dissemination Centers here has recognized one of its members for outstanding work in the field of bibliographic data bases.

Dr. Margaret K. Park, director of information services at the University of Georgia Office of Computing Activities, has worked to improve the exchange of bibliographic data bases both in the U.S. and abroad.

Park holds B.S. and M.S. degrees in chemistry and received a doctoral degree in curriculum and instruction from the University of Georgia. She has authored or co-authored 23 articles or presentations and is a member of a National Commission on Libraries and Information Science.

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Legal Review of Contracts Seen Necessary

By a CW Staff Writer

WINTER PARK, Fla. — When it comes to executing vendor-developed lease/purchase contracts for computer equipment, many users discover too late that their pens were not mightier than the legal sword.

Without giving an attorney adequate time to review such contracts, users often sign what they believe to be lease/-purchase agreements that actually fail to include purchase options or even a purchase-option credit provision in the binding document, according to the March "Computer Negotiations Report" (CNReport).

While the lack of a "purchase" provision in so-called lease/purchase contracts may seem an obvious omission, vendors frequently state these provisions in "side letters" that may read something like this: "User will have the right to purchase the [equipment] at the end of the initial lease term for the rental payments previously paid by User during the term."

Overriding Clauses

This language appears to ensure the user a lease/purchase. Many vendor contracts contain what is called an "integration clause" that essentially eliminates and overrides any side letters, prior promises and oral representations of purchase options, however, the CNReport explained.

An integration clause can take the following written form: "This agreement constitutes the entire agreement between the parties hereto . . . and shall supersede all previous negotiations, commitments and writings."

Because side letters would therefore not constitute part of the binding contract, the vendor author of this kind of purchase provision legally retains full title to the equipment after the lease term expires. The user, in effect, has signed a straight lease contract.

Once bound by this kind of agreement, a user has little recourse available to him but to try to void the entire contract on the grounds of "fraud in the inducement," CNReport said. Unfortunately, as the newsletter pointed out, this tactic usually fails to invalidate a signed contract or to fulfill the user's ultimate goal — to gain title to the equipment.

A better defense is an offense. Users should involve legal counsel when contract negotiations begin, the report suggested, to ensure that the formal legal documents actually translate into the desired vendor-user transaction.

That way, if "purchase" provisions are missing or misrepresented, an attorney can write the necessary clauses directly into the contract.

The CNReport stressed the need for a thorough contract review and cautioned users against rushing to close agreements with vendors who claim they will be otherwise unable to meet the customers' delivery deadlines.

Priced at $195/year, the newsletter is published by International Computer Negotiations, Inc., 1331 Palmetto Ave., Winter Park, Fla. 32789.

Seminar at MIT To Cover Issues In Management

CAMBRIDGE, Mass. — The MIT Center for Information Systems Research (CISR) will hold its fourth annual summer session, entitled "Current Issues in Information Systems: A Perspective for the '80s," June 18-22 here.

The purpose of the seminar is to discuss significant issues in the management of the information systems function. In the course of discussing key areas in the field of information systems, CISR faculty and staff will present both the current state of the art and results of their own research.

Attendees should have a general familiarity with computer-based information systems. Enrollment is limited to 150 persons.

The cost of the seminar is $950, payable upon notification of acceptance. The course fee includes luncheons, a cocktail party and a conference dinner.

CISR is at MIT, Alfred P. Sloan School of Management, 50 Memorial Drive, Cambridge, Mass. 02139.

1, 2, 3 NCC

Don't miss Computerworld's complete, three-issue coverage of every aspect of NCC.

1. Our Preview Issue
On May 28th, our Preview Issue will cover everything that's coming up at NCC. We'll list the sessions, tell you who's speaking, review the exhibitors and what they'll be exhibiting, and even give you tips on what to do in New York in June. Don't leave for the show without this complete scorecard under your arm! Extra issues will be distributed at the **Computerworld** booth at NCC. Color close is May 11, black and white, May 18th.

2. Our Show Issue
This is the issue we publish as the show opens. It'll have last-minute show information, speech previews and other show details. If you're there, pick up a copy at the **Computerworld** booth. Issue date is June 4th. Color ads must be in by May 18th, black and white by May 25th.

3. Our NCC Wrap-Up Issue
Before the hall gets cold, our staff of 20 editorial people will have prepared their reports and filed them in time to appear in this informative wrap-up issue. You'll read who said what, who introduced what and how it works, and review the show's features and highlights in words and pictures. Issue date is June 11th. Color ad close is May 25th, and black and white ads close June 1st.

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Courses, Practicum in Computer Science

DP: Most Popular Subject at College for Deaf

By Jay Woodruff
CW Staff

ROCHESTER, N.Y. — The appeal of a career in DP has made it the single largest field of study here at the National Technical Institute of the Deaf (NTID).

Deaf students are learning to become computer operators, programmers, systems analysts and more at this school, which last year celebrated its 10th anniversary.

NTID was established in 1965 by an act of Congress to give deaf and hearing-impaired students the opportunity to prepare for professional or semiprofessional careers in a collegiate environment. It is the only school of its kind, school officials said.

Training also is offered in ceramics, photography and medical science, to name a few, but the interest in DP has caused enrollment in DP courses to increase out of proportion to the other subjects.

About 110 students participate in the DP program, out of a total enrollment of 800 students, according to NTID Dean William Castle. Students with the ability and inclination don't have to stop at the school's highest degree, an associate degree; they can go on to earn baccalaureate, masters and doctoral degrees at the Rochester Institute of Technology (RIT), all without leaving the campus.

NTID's program of teaching differs somewhat from programs for those who can hear. Ordinary classroom instruction, for example, includes a lot of lecturing. This creates a problem for the deaf student who tries to take notes and simultaneously read the instructor's lips, according to Donald Beil, staff chairman of the Instructional Data Processing.

In contrast, NTID classes, which generally have no more than 12 students, deemphasize lecturing and concentrate instead on group problem-solving. "Strong communications skills are built this way, and it involves all the students in the project. Since our students typically have fewer reading skills than students who hear [CW, March 26], we do more explaining ourselves before they read the material," he continued.

There are six DP faculty members, plus Beil, and four counselors. All know sign language, so communication is not a problem, he said.

All students begin their school career at NTID in the summer entry program. Approximately 300 students come to "the city that Kodak built" for six weeks to sample various major subject areas offered at the school, and they usually gravitate toward a specific interest.

By fall, most have chosen a major, and for 55 of them last summer, that major was DP.

After a year of programming and computer operation courses, the student is required to spend a summer gaining work experience. Students most often return to work in their home towns, according to Beil. In the fall, they return for additional course work in operations, after which they receive a certificate, qualifying them as operators of peripheral equipment.

Those students who choose to go on can complete additional programming courses, as well as courses in mathematics and accounting, graduating with a diploma after the spring semester and qualifying as computer operators.

An associate degree is awarded to students who continue for another summer of work experience and two more semester quarters of schooling. This prepares them for entry-level business programming positions.

The enterprising student, whose capabilities and interest exceed what NTID had to offer, can then begin course work at the RIT campus itself. The student can enroll in one of four programs — Applied Software Science, Computer Science, Computer Systems or Systems Software Science, Beil stated.

After a total of five years at NTID and RIT, the successful student can qualify for a baccalaureate degree or continue toward a higher degree.

NTID students or deaf transfer students who decide to take courses at RIT are often confronted with large lecture halls and the problems they pose for the deaf student. To compensate, NTID assigns each student a tutor-notetaker who attends class with him.

With this arrangement, the deaf student can concentrate on the lecture, while the notetaker (who completed the course previously) takes notes.

Later, he can tutor the student to make certain he understood the material.

The Big Step

When the student has gone as high up the educational ladder as he wants, an NTID placement group works with the student, coaching him on interviewing techniques and preparing resumes and letters of application, Beil noted.

Students with satisfactory work records during their summer employment are often invited to return to a permanent job, he added.

Consultant Urges Barrier-Free DP Center

MIDDLEVILLE, N.J. — DP centers should be designed to take into account the special needs of handicapped DPers, a member of the national advisory committee for the National Technical Institute for the Deaf (NTID) said here recently.

Making barrier-free centers is not an expensive proposition, according to Belden Menkus, an independent management consultant. "It is not a question of expense, but an emotional thing," he said.

"I know of very few DP departments that have been designed to be barrier-free, so it's difficult for someone in a wheelchair or braces to move around. For all the literature that has been disgorged about DP design over the last 20 years, I can't recall a word of type from anybody on this subject," he declared.

Business attitudes toward hiring handicapped DPers impinge on their ability to get a job, he said. Speaking of the DP program at NTID, Menkus said, "They've got a track record of graduates who are holding their own in competitive job situations. They're getting a good sound professional education in this field and are going out expecting to hold their own."

In DP, where many persons underachieve, he lamented that many handicapped persons do not get the chance to show what they can do.

The consultant indicated, however, that institutions like NTID would help bring about a more aware generation.

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Editorial

Salute to Number Crunchers

Soon after radiation began to seep dangerously from the Three Mile Island nuclear power plant, a corps of DP experts at several independent facilities across the nation initiated computer-based analyses aimed at reducing the potential for catastrophe.

The overheated General Public Utilities Co.'s plant near Harrisburg, Pa., almost experienced an uncontrollable "meltdown" about a month ago. Millions of people — some of them unborn — were threatened with radiation poisoning.

Pennsylvania Gov. Richard Thornburgh and federal authorities relied on computer-assisted tracking of the Three Mile Island radiation — as it drifted with the winds — in deciding whether to order the evacuation of hundreds of cities, towns and rural communities.

A number of private firms and research organizations ran simulation software to find out what might have caused the reactor accident, the extent to which the reactor core was damaged and how a safe "cold shutdown" could be achieved.

In delivering those emergency services, hundreds of DPers displayed a high degree of professionalism and commitment to the public interest. While debates have started on whether any computer systems failures or programmer errors were partly to blame for the Three Mile Island mishap, the role of DP in helping to resolve the situation is undeniable.

This role demonstrates just one of the ways society has come to depend on the dedication and skill of DP professionals in addressing its most serious problems.

Let the Controller Handle It

Air traffic control is a socially critical operation that demands support from sophisticated, reliable computer systems. Many air traffic controllers fear they will not have sufficient DP support in the near future because the Federal Aviation Administration (FAA) wants to extend the responsibilities of air route traffic control centers (ARTCC) to a degree that would swamp installed ARTCC systems.

FAA Director Langhorne Bond advocates lowering the positive control airspace (PCA) from 18,000 feet to 10,000 feet east of the Mississippi River and in parts of California and to 12,500 feet over the Rocky Mountains [CW, April 23].

But air controller spokesmen feel the FAA has misjudged the work capacities of existing ARTCC computer facilities. The agency's assessment of DP needs in air traffic control made in the mid-1960s greatly overestimated those capacities, according to the president of the Aviation Safety Institute of Worthington, Ohio.

Sentiment that ARTCC systems are overburdened with the 18,000-foot PCA level has sparked several work slowdowns and legal actions by angry air controllers. Bond's proposal throws salt on their wounds.

Surely the air controllers have the best insight into their own needs. Congress should heed their complaints and consider a major upgrade of ARTCC resources in DP; otherwise, the security of air travel could drop much farther than Bond's airspace ceiling.

Data Past

Five Years Ago
May 1, 1974

BILLERICA, Mass. — The age of the Honeywell hardware hodgepodge — inherited from the consolidation of General Electric (GE) computer operations nearly four years before — drew to an end with the announcement of Honeywell's Series 60 line here. The main thrust of the announcement centered on upgrades for the 6000 series of computers — the evolution of the GE 600 series.

— — —

WASHINGTON, D.C. — The Federal Bureau of Investigation was ordered to remove from its criminal files (such as the computerized National Crime Information Center) the arrest records of people later exonerated of the charges for which they had been arrested. The ruling, handed down by the Court of Appeals for the District of Columbia, appeared to be an effort to force the FBI to take a more active role in assuring that disposition of cases be included with arrest records.

Eight Years Ago
May 5, 1971

PALO ALTO, Calif. — The salaries of programmers and other DP personnel rose in the past year, according to a survey conducted by Source EDP, a national placement firm. However, the Source conclusion differed from that of the Robert Half agencies, which saw a 2% to 10% drop in starting salaries. Source saw a slight rise in DP salary levels, generally 1% to 2%.

— — —

NEW YORK — International Computers Ltd. expanded its 1900 series to include several models that compared favorably with the IBM 360 and 370 models on a price/performance basis.

Letters to the Editor

Neglect of Quantity?

I have a comment to make on "ACM Proposes Computer Science Curriculum" [CW, April 9].

After a decade of advances in the art of computer measurement, I would have expected the Association for Computing Machinery (ACM) to offer at least one course on instrumentation and quantitative analyses in the curriculum at the undergraduate level.

Certainly I would have expected to see a course on operational analysis and related modeling topics at the graduate level.

How can a "science" exist without experimental quantitativeness? Let's call it the Computer Arts Curriculum. And let's change the name of the ACM to the Association of Computer Mathematicians, since computer mathematicians don't seem to understand the need for quantitative theories.

Kenneth W. Kolence
President
Institute for Software Engineering
Palo Alto, Calif.

Operators' Contribution

I agree with most of the points raised in Mark Morris' reader commentary on operator morale [CW, April 9]. However, I feel that Morris understated the contribution made to a successful DP operation by good computer operators.

As an insurance company, we are dependent upon production data processing to meet our service objectives. We advocate that operators know as much as possible about production applications from both written documentation and experience.

This knowledge and experience not only permit operators to correct problems, but often to detect them before they occur. Somehow, good operators seem to develop the ability to determine that something is wrong because "it just doesn't feel right."

I concur with Morris' final comment about the effect that operators can have in preventing or delaying hardware expansion. This is accomplished through their ability to push the installation to its maximum capability.

Philip H. Funk Jr.
Director, Computer Services
Blue Cross/Blue Shield
Concord, N.H.

Tempered Criticism

I read with interest and a little irritation two articles in the March 26 edition. The first was what I consider slightly underhanded journalism, and the second was a slightly misleading article. "Private Packet Net to Back Use of 2780-Type Terminal" was couched as a news article, but was authored by the company selling the service. I think it would have better been openly declared as advertisement. That would convey the information in an open manner and still identify the source as one with a vested interest.

"DEC Tops Vendor List in Federal Inventory" was a little more subtle form of slanted journalism. While I personally am not an employee of any vendor at this time, I feel that statistics of this kind are only meaningful if they are reduced to a common denominator.

Are we to believe that DEC provides 24.5% of the computing power that is utilized by the Feds? An obvious absurdity. Do we derive from the management of the numbers that the Department of Energy uses more computer power than the Social Security Administration?

Would not a more meaningful measure have been the comparison of government agencies in IBM 370/145-equivalent or possibly Digital Equipment Corp. PDP-11/70-equivalent environments?

Michael J. Gates
Dhahran, Saudi Arabia

Reader Commentary

Bureau of Nameless Terror Has Slow Year

By Joe Rigo
Special to CW

The Bureau of Nameless Terror is having a slow year.

The bureau is an obscure government agency. Its mission is to wake people up at three o'clock in the morning, drenched in sweat and cowering vaguely from the unknown demons of the darkness.

Discovered a few years ago by Paul Gorman, a New York radio performer, the bureau is especially active in data processing. It specializes in operations managers and self-employed consultants.

This year, times are just too good. The Bureau keeps trying to do its job, but its regular customers simply grumble and go back to sleep.

There must be a few losers out there, but it seems that everyone else is doing well. This analysis is certified by two of this country's most reliable economic barometers: my landlord and Bentley, my favorite composite programmer.

My landlord's position is revealed in a little ritual that we go through every few weeks. He asks my opinion about some computer hardware manufacturer. I tell him what I know about the company, if anything. He then tells me that he bought its stock two months ago, and it has already gone up six points.

We have gone through this routine now with a rather large number of companies. It is clear that my landlord is, making a bundle, and it doesn't seem to matter what stock he picks.

Bentley is also having a great year. In fact, he is thinking of going public.

It is not a bad idea. Bentley is currently getting $400 a day for a long-term assignment with a large bank. Being self-employed, almost everything he spends is tax-deductible. All in all, he is more profitable than many companies on the Fortune 500 list.

Bentley's friends seem to be doing just as well, although most of them are not yet in the $400-a-day category. They all have more work offers than they can handle, and raising their rates doesn't slow things down a bit.

Companies like Bentley because he is skilled, experienced in their applications and reliable. He gets the job done, and he completes it in a reasonable time.

A New Era

There can be no doubt about it. We are in a new era.

Ten years ago, after-dinner speakers liked to joke about bearded programmers walking around barefoot, constantly scratching themselves.

Five years ago, the systems analyst was king. A person was insulted if you asked him to read or write code. It was freely predicted that programmers would automate themselves out of existence within a very short time.

Now we have minis, micros and new users everywhere. Our schools are churning out enormous numbers of bodies, but the number of new jobs is growing even faster. Companies pay rates of $150 to $400 a day and are happy to be able to find someone willing to take the work.

Right now, I know at least a half dozen programmers who are making $50,000 to $100,000 a year. I know others who could do it, except they like to take summer vacations that run from early April until late September.

These folks are good at what they do, but they aren't setting any records. Some work regular 35-hour weeks. Others never stop working. Some work at home. Others work in project teams in the client's office.

The best paid are those who know how to get a Digital Equipment Corp. or Data General Corp. mini working with a bunch of remote terminals. Still, there are a good number of Cobol applications types doing almost as well.

They have a few things in common. Virtually all are men. Most have several years' experience as employees on applications in the same industry where they are currently freelancing. They know what they are doing, and they can be counted on to do it well.

They Have It Made

Things will get worse, no doubt. Even DP has a slow year once in a while. The Bureau of Nameless Terror will ride again.

Right now, though, independent programmers have it made. They are right up there with doctors and lawyers and the guys who sell exhibit space at the National Computer Conference.

I know one who lives in a Manhattan co-op and just bought his first yacht. He plans to take prospective clients boating on weekends. During the week he codes payroll programs for insurance companies.

If he ever goes public, I'm going to recommend him to my landlord.

Rigo is president of Sysdoc, Inc. in New York.

The Human Connection

Retail Boom Credited To 'Wild-Eyed' Hobbyists

By Jack Stone
Special to CW

The Computer Emporium, one of the fastest growing computer dealerships in Washington, D.C., has made a history typical of the computer retail store phenomenon. In business now for about 18 months, it recently made the first move in its ambitious plans for 150 outlets throughout the U.S. in the next five years when it opened a second store in the area.

Trying to separate the hoopla associated with this type of merchandising from the real facts, I interviewed Leland Bristol, the Emporium's president.

Q. Lee, how do you now perceive your marketplace?

A. Although both the market and our understanding of it are changing, we feel we've learned enough to have confidence in our current assessments. We structure the market into three segments, which I'll rank in a sequence which roughly corresponds to the business potential per account. We call them the hobbyist, the consumer and the commercial markets.

Q. And, of course, it all started with the wild-eyed hobbyists.

A. Sure. These are the people who have been involved with electronics hardware kits for years. They are the ones — like the confirmed ham operators — who first built radios, then TVs and have now graduated to general-purpose computers. For the most part, they have been hardware-oriented and enjoy the fun of assembling the machine.

But it wasn't much fun for the kit manufacturers who not only were facing terribly price-conscious customers, but also seemingly unending hassles resolving bugs with them.

So, except for a few, the micro kit manufacturers have either left the business or sell packaged microsystems. The typical hobbyist these days buys a box with a power supply and installs boards that he acquires from different suppliers to meet his specific needs.

Q. How does the "hobbyist" relate to the "consumer"?

A. Both of these buyers typically come from the same social and economic group: young, middle income professionals. But whereas the hobbyist has a very strong data processing background and is often a professional DPer, the consumer is characterized as an end user with relatively limited DP experience.

And, similar to the perspectives of the end user associated with large computer centers, the con-

(Continued on Page 23)

The Taylor Report

Information Net Lacking At Nuclear Power Plant

By Alan Taylor
Special to CW

A time-lapse information system might have prevented a lot of trouble at General Public Utilities Co.'s Three Mile Island nuclear power plant in Pennsylvania. While much discussion has gone on about whether various information systems worked properly, the real point is that one or more systems were missing altogether.

Let us consider Three Mile Island information systems requirements. The Nuclear Regulatory Commission requires that nuclear power plants have contingency planning and evacuation procedures. The information system should be able to handle matters up to and including the actual evacuation.

Three Mile Island's information system wasn't up to that capacity. In fact, what the board chairman of Stride-Rite Corp. said recently when asked how reliable projections of future sales were may apply here — that the firm "had an awful job in trying to reconstruct the past, never mind reliably forecasting the future."

Even reconstructing the past was beyond the capability of the manual information system at Three Mile Island. Some gas was released from the plant on Friday, March 30, but whether it had been "expected" was a point of contention. The governor of Pennsylvania's statements flatly contradicted those of the plant operators.

People might not have known whether the radiation was ex-

Do you have complaints about the way firms handle finance charges? The Swedish approach to this matter is discussed in next week's Taylor Report.

pected, but they did have the knowledge — if they cared to think about it — that the information system they had to depend on for news about Three Mile Island was faulty.

The technical points involved here come up in various forms of familiar, traditional puzzles. In one version, the problem concerns two groups of people — one of which always lies and one of which always tells the truth. The two groups, of course, are otherwise indistinguishable.

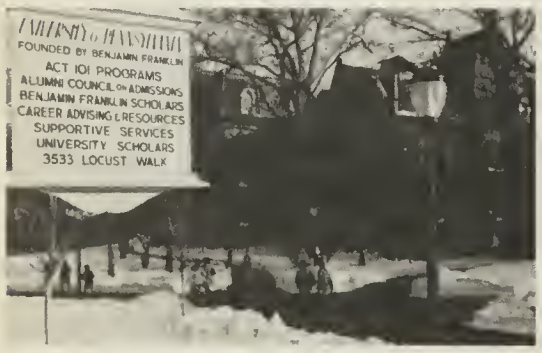
If an observer meets two people, one from each group, how can he tell them apart?

In a second version of the same logical puzzle, a Chinese emperor locks three professors in a

(Continued on Page 26)

"All we wanted in a 3270 replacement system was 30 day delivery, low price and high flexibility. And we got all we wanted from Computer Optics."

-Joe Penderghest Director of Field Applications, University Management Information Systems, University of Pennsylvania



The University of Pennsylvania. As a center of higher learning, it's famous for it's academic excellence. And the same kind of strict standards they expect from their students, they also expect from their suppliers.

Joe Penderghest, Director of Field Applications, explains, "We had three basic requirements for a 3270 system. First, we required exceptionally tight delivery. Second, we required a competitive price. And third, we required a system with the ability to install terminals away from the controller."

As you might expect, they examined a number of different vendors. And as you might also expect, not many vendors passed. In fact, there was only one—Computer Optics.

"We ordered a controller, ten terminals and two printers. Thirty days later they were installed, and up and running perfectly. And we've never had a smoother installation."

In addition to systems, Computer Optics also delivered price and flexibility. "With Computer Optics, we could install terminals up to two thousand feet from the control unit, without paying thousands extra. In fact, Computer Optics was either priced on a par with or lower than every other vendor we looked at. Needless to say, we're quite pleased."

They're so pleased, they're planning to pull out a current 3270 system and replace it with Computer Optics. "We are going to add ten more terminals to our existing Computer Optics unit. And in the near future, we're planning to add another controller and seven to ten more terminals. As a result, we foresee saving a considerable amount over the competitive systems we're using now."

If you're thinking about 3270 replacement systems, take a lesson from Joe Penderghest and the University of Pennsylvania. Give Computer Optics your test of delivery, price and flexibility. If you would like more information, fill in the coupon below.

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Profession Demonstrating Progress

Security, Quality Assurance: Audit Offshoots

By Jay L. Allen
Special to CW

Among the changes that are slowly emerging in the DP audit [CW, April 23] are those involving security and quality assurance. While these two areas are not necessarily a part of the changing direction in DP auditing, they do appear to be important by-products or offshoots.

A few of the larger DP organizations have established or are establishing a quality assurance function. While this function may have some overlapping objectives with DP audit, it seems to be a committed effort on the part of DP leadership to clean up and strengthen its own department in the important areas of better systems design [life cycle], tight DP/-user controls, adherence to standards and documentation, more efficient manpower and hardware utilization, project control and, in general, more cost-effective DP.

With computer fraud and embezzlement becoming more popular, some of the larger banks in particular are beefing up the security aspects of DP audit by establishing security administrators who normally have different reporting relationships in the organization.

Integrated Auditing

One of the major corporations in this country which is recognized for its very progressive and professional managerial methods — not to mention its very high profitability — has successfully married the normal internal audit function with the DP audit function in such a manner that it might well be referred to as "automated audit."

In this company, DP audit specialists have provided extensive in-house training for the internal auditors and vice versa. As major audits are planned and scheduled, a team leader is assigned the particular audit involved; he pulls support from the available staff as required, which makes for great flexibility.

This company utilizes compensating control methods which include both preventive and detective measures and involves users and the DP auditing, accounting and legal staffs. The company feels very strongly that this hybrid approach is not only producing faster audits at less cost, but can cover a much broader corporate scope.

The sophistication of audit software, languages such as Cobol and large data bases are certainly some of the reasons for the success of this company's approach. This new direction would seem to show tremendous progress in the field of auditing and is in sharp contrast to the old concept that the function of the DP auditor is only to write programs and generate reports for internal audit.

While this example of an integrated automated audit function is thriving, the trend, as we hear and see it in job descriptions from top companies, seems to be just in the planning stage in all industries. Many audit professionals seem to feel this integrated approach will allow them to better utilize the varied experiences of the DP auditors and internal auditors in such a manner that more comprehensive audits can be conducted with less staff, in shorter time and for less money.

On the other hand, a general auditor of a Fortune 100 company stated categorically that he definitely could not support this hybrid approach because DP audit should, in fact, support internal audit.

The relatively young DP auditing profession is demonstrating great progress as it provides significant leadership and contributions to companies' security, growth and profitability. There are many factors which are contributing to the development and recognition of this profession.

Among them are the national EDP Auditors Association, Inc and its EDP Audit Foundation, the Institute of Internal Auditors and its outstanding study groups, innumerable papers and lectures in related fields, the advent of a national program for certification of these specialists and — perhaps of greatest importance — the DP auditor's dedication to accuracy, performance and excellence.

This is the lost half of a two-part series. Allen is with Allen Manogement, Inc. of Oklahoma City, a nationwide recruiter of DP auditors.

Reader Commentary

Credit for Retail Boom Given to Hobbyist Sector

(Continued from Poge 21)

sumer is not terribly interested in the hardware, but with the applications of the machine. Consumers certainly want their fun and games, but more recently we have seen the trend toward serious self-training in programming as a means for designing home systems.

Consumers generally recognize that today's applications are rather primitive, but most of them are looking ahead to the future, when they expect a broad range of home applications packages and low-cost peripheral devices to attach to their processor. And many are interested in sharing their interests with their children. Maybe it's a case of the family that computes together, stays together.

Q. What are your views toward the "commercial" market?

A. There are two submarkets here. The first is composed of small and medium-size firms seeking their first in-house computer system. Most of the organizations in this category, however, have had service bureau experience and are examining alternatives. They are very price-sensitive and feel they can afford a microsystem, but not much more.

The second is the established data processing organization with heavy technical expertise. This buyer is looking for low-cost, reliable hardware/-software systems to off-load inefficient applications from their large host processors.

Applications packages are not that much of a problem here, since we believe the typical staff will want to program its own applications systems.

The areas we see as particularly fruitful are those which, as you might expect, do not require mass storage or are not time critical. They include "office of the future," source data entry, project management and similar types of applications.

But another one that kind of intrigues us is program development. Right now we're looking at ANS Cobol and Fortran compilers for one of our microsystems. Wouldn't it be nice someday to get the bulk of that source program debugging activity off big machines and onto low-cost micros sitting on programmers' desks?

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'Systems Analyst' Title Most Abused in Industry; Redefinition Imperative

By Michael Wood
Special to CW

"Systems analyst" is probably one of the most abused job titles in the DP industry today. A systems analyst could be anyone from a junior programmer to a highly sophisticated systems developer.

The problem facing the industry is one of definition. We, as an industry, seem to enjoy being vague about our responsibilities and roles related to systems development. We appear to delight in watching users and management slowly go berserk with frustration as they cope with the ambiguity of it all.

In an effort to clear the muddy waters, let's consider some guidelines in defining the role the systems analyst should play in the systems development effort.

In order to address the problem squarely, the question "What is a systems analyst?" must be answered. I submit that systems analysts are people who communicate with management and users at the management/user level; document their experience; understand problems before proposing solutions; think before they speak; facilitate systems development, not originate it; are supportive of the organization in question and understand its goals and objectives; use good tools and approaches to help solve system problems; and enjoy working with people.

Unfortunately, our industry tends to encourage systems analysts to accept responsibility for projects they do not understand; treat user symptoms as illnesses; develop systems in a vacuum; avoid understanding system objectives; assume authority to make changes without management or user concurrence; avoid all forms of documentation other than code; and discourage management and users from becoming educated in data processing.

Although this description might offend some readers, the truth of it is evidenced by the number of well-designed and well-documented systems in existence in the world today. The scarcity of quality systems is matched only by the scarcity of well-informed users.

Why has this situation arisen in the DP industry? Basically, the problem has developed because of a lack of understanding between management, users and DP as to who is responsible for what during a systems development effort. It is no wonder that confusion runs rampant when the analyst, for whom there are no selection criteria, is relied upon so heavily.

Like a Doctor

What should the analyst's role be? It changes depending upon the stage of the project in the systems development life cycle.

For the purposes of this article, the systems development life cycle will consist of the planning and problem definition phase, the requirements definition phase, the design phase, the construction phase, the implementation phase and the evaluation and use phase.

During the planning and problem definition phase, the analyst should assume the role of a doctor diagnosing a patient's illness. Through close communication with users and management, quantification of the organization's goals and objectives and modeling of the organization's functions, the analyst should be able to distinguish between symptoms and real illnesses or problems.

Reader Commentary

The goal of the analyst at the end of this phase is to develop a project scope with measurable goals. In other words, the systems analyst should assist the organization in developing a framework and environment in which project progress can be measured and evaluated.

Role of Facilitator

During the requirements definition phase, the analyst should assume the role of facilitator. The analyst should be applying his systems expertise and creativity to the users' efforts to determine what outputs and related information requirements must be met to satisfy the objectives established during the preceding phase.

The analyst should keep in mind that the system is being designed around functions, not individuals. In addition, the analyst should not impose his will on the user, but rather assist the user through constructive suggestions and guidance.

During the design phase, the analyst's role begins to shift away from user/management systems facilitator and towards system architect. Where the analyst was breaking down the systems through logical analysis in the previouis phases, now he begins to build the system through logical design.

The analyst should begin to develop the structure of the data defined in the previous phases, taking into consideration the structure of eah system output, the time relationship of the outputs, the events that trigger the creation of outputs, the data base required to produce the outputs and the logical input and update activities required to produce the data base.

The analyst should begin to involve the DP programming staff during this phase and should become an orchestrator of programming efforts. He should also maintain effective communication ties between DP and the user organization through these design efforts.

At the end of the design phase, the analyst should be in possession of a document that reflects:

- The organization's goals and ob-

(Continued on Page 26)

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'Systems Analyst' an Abused Industry Title

(Continued from Page 24)
jectives.

- The project's scope.
- A functional model of how the organization conducts business.
- An operational flow that reflects the organization's goals, objectives and functional flow concepts.
- A design that reflects how the project's goals and objectives can be implemented.
- A design independent of hardware and software.
- A design that aligns organizational and operational goals.

This document should be as easily understood by the users and management as by technical DP staff. It should serve as the foundation of the organization's planning activities in the future.

During the construction, implementation and evaluation and use phases, the analyst's role becomes that of coordinator. Basically, the analyst ensures that all major events or milestones occur when planned. The analyst should try to coordinate all user and DP activities to ensure a positive environment.

Obviously, someone who could perform all the functions described above would be hard to find. Such a person would have to possess strong interpersonal skills, a management theory background, a DP background and an acute understanding of the organization's management and operational goals and objectives.

In light of all these skills and attributes, one can easily see how careful management should be in selecting the individuals to whom the title of systems analyst is to be given.

Wood is manager of system advisory services for Wilson & Hughes, Inc., certified public accountants in Thousand Oaks, Calif.

Information Net Lacking

(Continued from Page 21)
room after painting either blue or red marks on their foreheads. A professor can come out if, and only if, he knows what color he is or can see two red marks.

The point is that a time lapse occurs between the original actions (the meeting in one case and locking up the professors in the other) and having the results available to output.

A time-lapse information system produces more accurate data than a system that doesn't allow for a time lapse. In fact, I wonder if the latter system should be called an information system at all.

A system that doesn't allow for a time lapse can be labeled data processing, data base, forecasting or computerized. However, it should not be called an information system if some degree of care is involved in output accuracy.

System accuracy is different from accurate processing or dirty input avoidance. These work correctly even when the answers are wrong.

None of the current computerized systems I know of make any use of the lapse of time needed to improve the quality of the information they put out. If you know of one, I would be interested in hearing about it.

Garbage in, garbage out (Gigo) would probably tell you whether a computerized system is an information system. If garbage in means garbage out, then the system can't tell food from garbage. And it can't be trusted to prepare meals, even if it is allowed to fill ditches.

Information systems that can't tell food from garbage shouldn't be the only ones available at places like Three Mile Island. Our industry can do a great deal better.

Even in the Chinese emperor's puzzle, not much time is needed for the information system to function properly — perhaps about seven or eight seconds. The other one — differentiating between liars and truth tellers — takes longer. I estimate about 30 seconds to a minute can elapse there.

And I mean the information system *in the puzzles*, not the time you take to solve them if you don't know the answers. (No, I'm not giving the answers here.)

Time, of course, is what computers are particularly good at saving. Thirty seconds is all the time we need to put into operation enormous banks of data and forecasting techniques, to obtain satellite and network linkages across the globe and to have access to resources on many continents.

A time lapse information system — one as Gigo-proof as possible — would have helped at Three Mile Island. Its absence caused America much unnecessary damage.

If we now go forward and build such a system, we can strengthen not only this country, but the world in a way that only computers can. I have my own ideas (which I will be talking about here), but I'd also like to hear yours.

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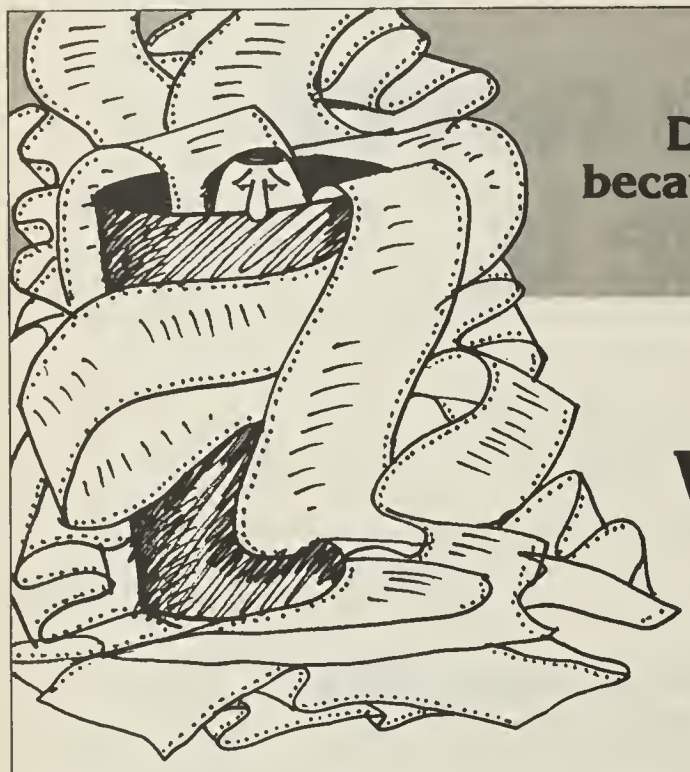

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Benchmarks Indicate

RCS Nets Using CDC Gear Cost Less

By Don Leavitt
CW Staff

STAMFORD, Conn. — If the cost of using computer resources — the CPU, main memory and I/O channels to disk — were the only criterion to be considered in deciding which remote computing service (RCS) vendor to use, the selection process might come down to knowing what kind of mainframe the vendor uses.

That was certainly one interpretation of the results of a series of benchmarks run by Real Decisions Corp. (RDC) on 18 different RCS systems late last year.

In the tests, services using Control Data Corp. equipment were least expensive in almost every situation. Services using IBM hardware were most expensive for all I/O-intensive runs. IBM- and Digital Equipment Corp.-based systems took high honors for computational work, RDC reported.

The test collection included 12 Basic and 10 Fortran runs, designed to be either I/O-intensive or computation-intensive. Both Basic and Fortran programs were used in each category.

In most cases, the same application was coded by RDC personnel in both languages to aid comparison of the cost performances.

The intention was to test the billing algorithms, not the vendors' unique ways of solving programming/processing problems. To be sure all programs could be run without change on all systems, low-level implementation of Fortran and Basic were used throughout the series.

The RCS services exercised — and paid for, under standard contracts — by RDC included operations with CDC gear at Boeing Computer Services, Inc. (the EKS service), McDonnell Douglas Automation Co., United Computing Systems, Inc. and CDC's own Cybernet.

DEC equipment was accessed through the facilities of ADP Network Services, Inc., Calldata Systems, Inc.'s computility operation, Compuserve, On-Line Systems, Inc., Rapidata, Inc. and the Tycom X portion of Tymshare, Inc.'s RCS offerings.

IBM mainframes were the mainstays at Boeing's CTS, Informatics, Inc., National CSS, Inc. The Service Bureau Co. (SBC) and Tymshare's Tycom 370 services.

While system resources are important, they are not the only costs levied against the RCS user. Other costs could be even more significant, depending on the user's needs, so RDC also measured and reported the comparative costs of connect time and data storage. The results sometimes ran counter to the runtime resources costs.

In connect time, for example, CDC-based systems were found to be the most expensive ones for users working at 15- and 30 char./sec. IBM-based systems were least expensive at 120 char./sec. These patterns held for both prime and nonprime time linkups, RDC reported.

Storage costs showed DEC-oriented services highest at all in-

(Continued on Page 29)

Cincom Offers MRP Package

CINCINNATI — A flexible material requirements planning (MRP) package is now available from Cincom Systems, Inc. for use on IBM-based installations using Cincom's Total data base management system.

The Manufacturing Material Planning System (MMPS) is the first application package offered by Cincom, a spokesman noted. Described as the first component of an even broader Manufacturing Resources Planning System that will evolve over the years, MMPS consists of four functional subsystems and three support subsystems.

The bill-of-materials processor (Bomp) subsystem includes the coding to generate parts explosions and to maintain the data bases on which the explosions depend. This module takes into account engineering changes by effective date, pending engineering change reviews and the impact the changes have on the assemblies under the processor's control.

The material control processing subsystem provides file management for inventory balances on hand, "on-order" conditions at detail levels for all forms of orders and detail level support for both dependent and independent demand, the spokesman continued.

The master schedule maintenance subsystem controls the master production schedule as well as related storage plans and provides status reports to management.

The MRP analysis and order status review subsystem performs activity-driven net change or regenerative MRP analysis, as well as identification and reporting of exception conditions. The module includes "nervousness dampening" controls, detailed and time-phased material plan reporting and automatic aging of purchase and manufacturing orders, with manual override.

The largest module in MMPS is 70K bytes. The system has been run on IBM hardware ranging from the System/3 Model 15 through 360s and 370s and on a Univac 90/40.

The complete software package costs $60,000; Bomp can be acquired separately for $30,000 and the other capability — the MRP support — can be licensed by itself for $40,000.

Cincom is at 2300 Montana Ave., Cincinnati, Ohio 45211.

DG Enhances Icos for CS Family

WESTBORO, Mass. — Data General Corp. has enhanced the Interactive Cobol Operating System (Icos) in addition to adding another level of processing power to the CS family of small business systems (see related story on Page 41).

Used by all of the CS family, Icos has been extended in various directions. Revision 4.0 of the software has features that ease program development, operational tuning and end-user access to the systems, according to a spokesman.

To help the developer, for example, the update includes 10 new commands to enhance the Interactive Cobol Editor, a COMPUTE verb that allows the programmer to express multiple functions in a single statement and an improved CRT screen formatter, he said.

Operations stand to be improved through use of an enhanced print spool facility on the one hand and the introduction of a Collapse utility on the other. Collapse allows the user to condense Isam index levels for more efficient record retrieval, according to DG.

An INQUIRE utility added to Icos should help both the programmer and the end user, the spokesman said. This feature allows users to browse through Isam files in order to add, delete or updata data. Once an Inquire operation pinpoints the location, the Editor can be used to make the change.

The enhanced interactive CRT screen formatter was described as possibly the most comprehensive enhancement. With it, users gain a free-form approach to defining what they want. Beyond that, DG emphasized, the software dynamically creates the code program needed to support the requested CRT screen.

Though DG considers its control software as a bundled part of its hardware systems, users acquiring Icos for the first time will face a $2,000 software services cost. This provides one year of DG's software subscription service, training credit at any of three locations and on-site installation and support.

DG is headquartered on Rte. 9 in Westboro, Mass.

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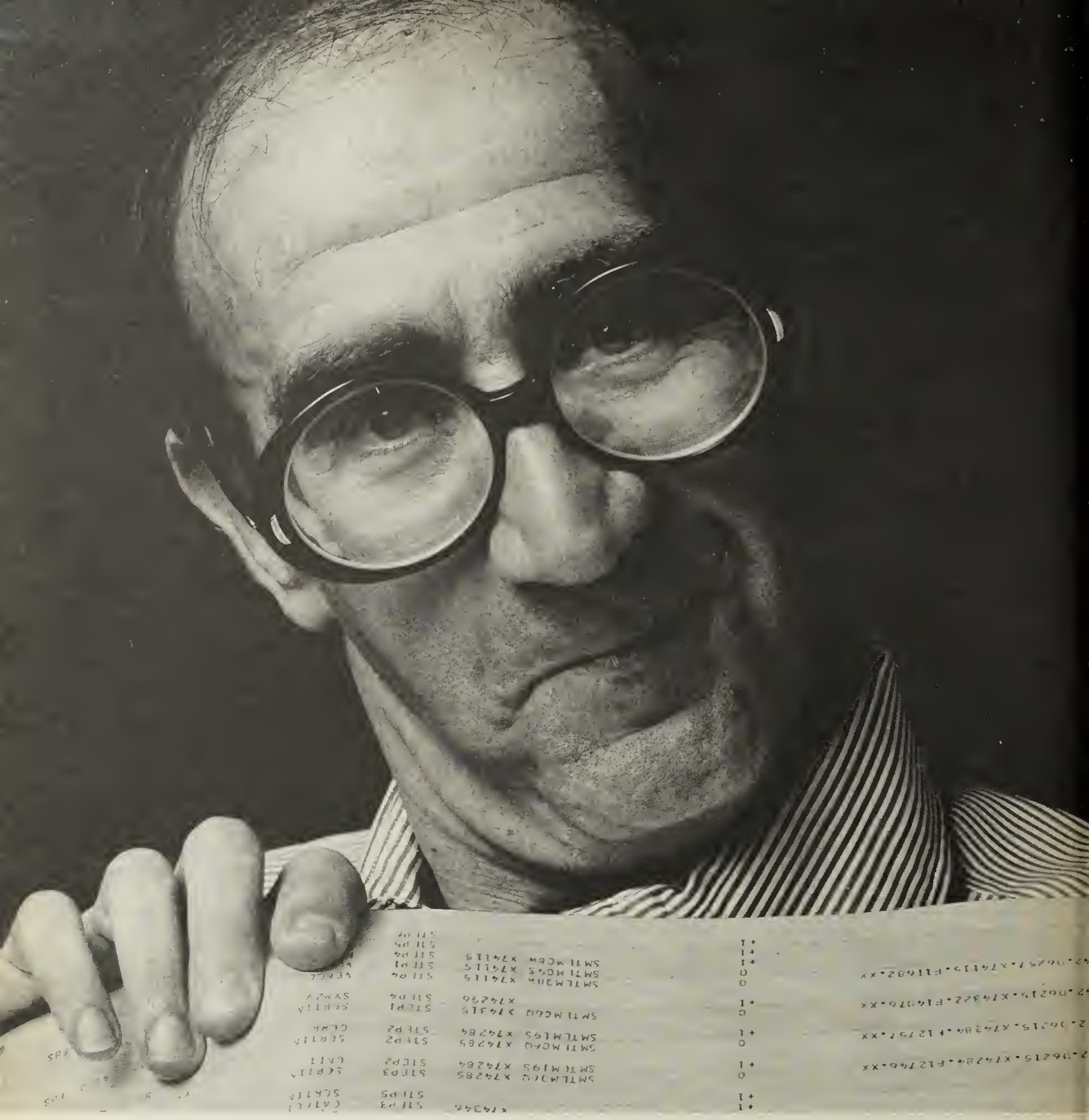

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'Scheduler' Includes Simulation

STERLING, Va. — The Scheduler, now available from Systematics, Inc., combines complete job scheduling, simulation and on-line tracking for data centers based on IBM 370 or compatible equipment.

The package automates control of the production workload from data preparation through delivery of the output, a spokesman claimed. In that respect it is similar to Apex from Johnson Systems, Inc., Dimension V from Software Systems Corp. or UCC Seven from University Computing Co.

The Scheduler maintains a data base of jobstream information, handles as many as 99 user-defined workstations and provides reports to management and operations personnel, the spokesman said.

The on-line capability of the package monitors the work flow through the data center, directs the processing at the workstations and provides status checking and interstation communication, according to the spokesman.

The system plans and schedules the entire workload, determining which tasks must be performed at each station. The simulation feature produces optimized schedules based on resource availability, the spokesman explained.

Developed by California-based Chronetics, the Scheduler enables users to include or exclude jobs, jobstreams or entire networks. It also supports unlimited forecasting and is capable of scheduling multiple-day networks with unlimited predecessors and successors, he continued.

Scheduling criteria include not only job dependencies but user requests as well.

The Scheduler is capable of supporting IBM OS/MFT or MFT, OS/VS1 or OS/SVS or MVS. The basic job scheduling module costs $8,000. Simulation support and on-line job tracking are extra-cost options at $8,000 each. The complete system costs $24,000.

Systematics is at 15 Brookfield Circle, Sterling, Va. 22170.

Seminar Set

WAKEFIELD, Mass. — A three-day seminar on managing technical programs and projects will be conducted May 15-17 at the Colonial Hilton Inn here under the sponsorship of the Polytechnic Institute of New York and the Institute for Advanced Professional Studies (IAPS).

The seminar is intended for professionals who plan, organize and direct engineering projects, IAPS said.

The role of the project manager as a team leader will be highlighted, along with techniques that control cost, schedule and performance parameters.

Tuition is $400. More information is available from IAPS, One Gateway Center, Newton, Mass. 02158.

Tests Show Cost of RCS Use

(Continued from Page 27)

crements, with IBM and CDC composites "relatively equivalent." But those overall statistics may be deceiving. The report noted that the high cost of storage at SBC "prevents IBM from carrying the day."

Although the RDC report focused primarily on the rationale behind and the results of the cost performance benchmarks, the authors were careful to spell out in some detail the other factors they said should be weighed in making the final choice of an RCS vendor.

The value of a service is determined by a combination of factors, weighted by the specific user needs. It is important, for example, to understand the profile of a vendor — its business foundation, emphasis and practices, the report said.

The 124-page report of the study and "hard-copy" listings of the 22 benchmark runs — "to be used in running the same tests in your own shop," RDC said — are available for $695 plus postage and handling charges.

Users should indicate whether the tests will be run on CDC, DEC or IBM equipment to minimize conversion problems, an RDC spokesman said from 111 High Ridge Road, Stamford, Conn. 06905.

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'Adex' Extends Facilities Available on Nixdorf 480s

BURLINGTON, Mass. — The Advanced Data Entry Executive (Adex) introduced recently by Nixdorf Computer Corp. for use on its 480 data entry system is said to provide "significant improvements" in system performance, system security, data security, data manipulation and communications.

Adex allows operator workstations to function in either a volume data entry mode or in a transactional query/-update mode to a host computer using IBM 3270-compatible protocols.

Operators specify which mode they want to use. Adex permits modes to be mixed, in any combination, among workstations in a given configuration, according to Nixdorf.

The 480 already had substantial physical security, a spokesman said, but Adex enables users to restrict access to sensitive data even further by pinpointing which operators may use which workstations and what functions, programs and files specific operators may access.

To protect against the loss of nonrecoverable data, Adex permits users to maintain duplicate sets of the data on independent magnetic disk drives. Recording takes place simultaneously on both and will continue on the secondary disk in the event of primary disk failure, Nixdorf claimed.

To utilize the $100/mo Adex software, users of the 480 will need a total disk storage capacity of 132M bytes and a self-correcting MOS memory that will be shipped with all new 480s and can be installed on systems already in use.

An auxiliary power unit will also be included in 480s from now on, the spokesman noted from 168 Middlesex Tnpk., Burlington, Mass. 01803.

Publishing Guide Released

LITTLETON, Mass. — While many software developers make a good deal of money selling their own programs, there are technicalities in the distribution process that must be considered, according to a book just released by a small firm here.

Free-Lance Software Publishing, a 100-page soft-cover volume, is written especially for the independent software developer, a spokeswoman for Kern Publications explained. It presents various techniques used by large corporations — as well as individuals — to advertise, market, license and maintain proprietary software products.

Covered are such topics as selling major software packages directly to end users; installing programs at service bureaus; selling low-cost software for personal computing; and publishing software in book form.

Setting up a program users group is discussed. Perhaps at the opposite end of the spectrum, the book also provides tips to help the independent programmer when negotiating with large corporations.

The book contains a chapter on software contracts and license agreements, including several sample documents. Of special interest, the spokeswoman claimed, is a section dealing with professional liability and ways to avoid it through indemnification.

The book costs $10 from Kern Publications, P.O. Box H211, Littleton, Mass. 01460.

'QLP 1100' Gains Editor, Better Links to DMS 1100

BLUE BELL, Pa. — Users of Univac 1100 series mainframes can utilize an editing capability and extensions to the data base facilities built into an updated version of the Query Language Processor (QLP 1100) software now available from Univac.

The editor included in the new release, called Level 3R2, provides an easy means of editing QLP report specifications, procedure definitions, macro declarations and format statements, according to a spokesman. Application developers can use the editor along with QLP to access a DMS 1100 data base.

Level 3R2 also supports a pair of QLP commands for establishing or dissolving certain owner record/member record set relationships in the data base. INSERT and REMOVE are aimed at the more knowledgeable QLP user and round out the processor's capabilities against DMS 1100-supported data structures, he explained.

QLP 1100 as well as DMS 1100 are available as part of the 1100 series operating system software, which is distributed free to users of the large mainframes, the spokesman noted.

SBC Aids Manufacturers

GREENWICH, Conn. — A system to help manufacturers in day-to-day planning and control of production orders has been announced by The Service Bureau Co. (SBC).

Described as a major segment of SBC's MFG/Plus integrated manufacturing control system, the Shop Floor Control System (SFCS) plans and schedules production orders on the basis of requirements, improves manufacturing efficiency and minimizes inventory investment.

In addition, SFCS includes production routing, information and maintenance, order or job scheduling and tracking with tooling and labor requirements by machines within work centers.

Other key reports and capabilities include open manufacturing order listing; order feedback and follow-up; work center dispatch list; order status review; order routing detail; and master schedule order simulation. MFG/-Plus includes net change material requirements planning, master scheduling, capacity planning, financial planning and purchasing in addition to shop floor control.

The system is part of SBC's Call Plus, which can be accessed via a local telephone call from more than 2,500 locations in North America, western Europe and the Far East. The network is headquartered at 500 W. Putnam Ave., Greenwich, Conn. 06803.

'Easytrieve,' IDMS Tied

OAK BROOK, Ill. — Easytrieve, the data retrieval package from Pansophic Systems, Inc., has been enhanced with the introduction of an optional interface to Cullinane Corp.'s IDMS data base management system (DBMS) and the updating of the interface to Cincom Systems, Inc.'s Total DBMS.

The individually priced IDMS option enables Easytrieve to be used with IDMS commands to examine and maintain an IDMS data base. It also provides an easy alternative to Cobol or PL/I as the language needed to build applications to work with data controlled by IDMS, Pansophic claimed.

The interfaces to Total 8.0 and to IDMS are available as add-on options to the basic Easytrieve package, which ranges in price from $18,500 (for OS installations) to $14,500 (DOS) and $8,500 (DOS entry-level).

The IDMS or Total linkages are $5,000 each, in addition to the cost of Easytrieve.

Easytrieve is also available for use with IBM's IMS or DL/1 environments.

In that case, the integrated retrieval package and interface cost $27,000 (OS), $21,500 (DOS) or $13,500 (DOS entry-level), the spokesman said from 709 Enterprise Drive, Oak Brook, Ill. 60521.

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'Xserv' Gives OS Procedure Cross-Referencing

MIAMI — A software package introduced here recently permits the user of a large-scale IBM system to cross-reference OS data set names from as many as 100 procedure libraries simultaneously, according to the vendor, Systems Software International, Inc. (SSI).

The package, called Xserv, can cross-reference data sets which reside on a specific DASD volume or volumes. This capability will indicate where the selected DASD data sets are being referenced in the user's procedure libraries and, by inference, which jobs are referencing which data sets, a spokesman said.

Xserv will also indicate all unmatched data sets on the selected volume or volumes. If these data sets are in fact completely unreferenced, they are clearly candidates for scratching, he added.

A condensed volume listing showing each data set name also reports space allocations, Extents and Data Control Block (DCB) attributes for each file on the volume. Xserv allows the user to include or exclude data sets by high-level index values, complete data set names or character strings.

A program verification facility cross-references program names encountered during the procedure library scan against members of selected load libraries determined by the user at run-time. This helps locate all nonmatched and nonexistent program names in the selected load libraries, the spokesman pointed out.

A partitioned data set (PDS) verification facility has the same basic purpose, but uses the member portion of the data set name as a search argument in determining member usage.

Xserv can run on IBM 360s, 370s or compatible mainframes under all versions of OS and OS/VS, including those running under the Virtual Machine facility (VM/370). The cross-reference utility does not modify the operating system.

Xserv costs $2,500 per installation site. SSI is at P.O. Box 160487, Miami, Fla. 33116.

Current Files, Data Bases Utilized by Report Writer

CANOGA PARK, Calif. — A report writer package just being introduced by Informatics, Inc. for IBM 360, 370 and compatible installations, Answer/2 is both easy to use and economical, according to an Informatics spokesman.

The package is easy to use because it is set in operation by a "natural, free-form query language," he explained. That allows managers, clerks and other non-DP-oriented personnel to quickly produce meaningful reports, he added.

Unlike some report writers, Answer/2 works directly with "most existing files and data base types," he said. Therefore, he noted, no need exists to create unique files before this particular package is put to work, he noted.

Report requests can be stacked so multiple reports are generated in a single file pass. The result, the spokesman asserted, is better throughput and more timely information.

Many capabilities are said to be part of the Answer/2 repertoire. These include matching of input files, "complete data independence," decimal alignment and field conversion.

Base prices in the U.S. and Canada start at $15,000 for DOS or $20,000 for OS implementations, with facilities for using data bases and on-line support as added-cost options.

Answer/2 is expected to be available after May 15, the spokesman noted from Informatics, 21050 Vanowen St., Canoga Park, Calif. 91304.

'Simile' Backs Minis, Micros

NEW YORK — The Simile package from Small Business Machines, Inc. (SBM) was described by a spokesman as a data base management, query and reporting system for minicomputers and microcomputers.

The system enables users working in 64K-byte or larger environments to collect, store, selectively retrieve and report data. Simile can be used to create and run applications for almost any kind of business, the vendor said.

One of the primary benefits of the system is its portability. It is not limited to any specific CPU architecture, and programs developed on one machine can be moved to and used on others without change, a spokesman asserted.

Based on English-like commands, Simile supports the definition, creation, accessing, maintenance and querying of a data base. It produces reports either at a CRT or a line printer.

A conversational system, the SBM software responds to simple inquiries and provides immediate information, as well as reports with formats designed by the user, the spokesman said. System security is provided through password checking.

Simile does not require programming skills, making it an ideal system for a first-time mini installation, SBM explained.

On the other hand, Simile can also be used to support a node in a distributed processing network, the spokesman pointed out. The single installation cost of the software is $6,500, he added from 527 Madison Ave., New York, N.Y. 10022.

'NAL' Designed For Accountants

NEW YORK — The Natural Accounting Language (NAL) used by the Report Customizer package provides a nontechnical vehicle for creating any kind of financial report without programmer intervention, according to developers at Miningham & Oellerich, Inc.

In effect, NAL enables the accountant to express both the financial aspects of a report and its format "just as he always did, without getting involved in 'data items,' 'DO loops' or any other DP technicality," a spokesman said.

"NAL is an electronic worksheet," he added.

The Report Customizer can be used in batch or real-time mode, depending on the CPU and operating system being utilized. In either case, the user communicates requirements directly to the system, and such output as multi-company profit and loss statements are "readily available."

Balance sheets, regulatory reports, cash flow analyses, product line profitability studies and statistical and trend reports are other possible outputs, the spokesman noted.

With the advanced version of the Report Customizer, budget simulations and currency conversions are also possible, he said.

Written in Cobol, the package is adaptable to virtually any environment supporting that language as long as at least 32K bytes of main memory and a reasonable amount of disk storage are available, its developers said.

The Customizer has been run on Honeywell, Inc., Burroughs Corp and IBM mainframes and on Data General Corp. Eclipse minicomputers. The software ranges in price from $10,000 to $20,000 depending on the features required, the company noted from 1212 Ave. of the Americas, New York, N.Y. 10036.

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Upgrades From WP to Networks Predicted

By Ronald A. Frank
CW Staff

CHICAGO — Larger, more sophisticated users will be the first ones to upgrade their word processing (WP) systems into networks that transmit data to DP centers, according to Carol Weiszmann, editor of the "Autotransaction Industry Report" newsletter.

Users who have already added communications to their WP systems have gone beyond simple text processing toward development of a "text processing network," Weiszmann said at a recent conference here. Equipment in these nets includes communicating word processors, facsimile devices plus output units such as printers, intelligent printer/copiers like IBM's 6670 and Wang Laboratories, Inc.'s image printer and some photocomposition units.

In addition, advanced text processing nets use optical character recognition page readers to convert incoming paper documents, such as daily mail, into digital form so it can be transmitted over the network.

While acknowledging that text processing nets are still in their infancy, most vendors who sell DP equipment are getting into the WP area in some way. Thus "it is communications that holds the key to merging of word processing and data processing," Weiszmann said.

Two Types of Nets

Two basics type of networks are being developed to handle textual material — networks for in-house document delivery and networks offered as services. But neither facsimile systems nor electronic mail systems are cost-effective enough in the U.S. "to constitute serious competition for the post office," she said. Most of these (mostly experimental) nets are presently cost-effective only in international service.

Today's networks generally convert documents to digital format, then reconvert them after transmission. In the future, however, messages will remain in digital form and he delivered without paper, bringing increased reliance on teleconferencing, voice communications and data communications, Weiszmann predicted.

After larger users develop text processing nets, their benefits will filter down to smaller users. Carrier nets such as those planned by Satellite Business Systems and Xerox Corp. will initially appeal to large users who will find themselves reducing paper for intracompany communications, but not eliminating the paper flow.

The real growth will occur when these nets are utilized for interorganizational information flow, Weiszmann maintained.

Exec Wishes Bank Turned to EFT Sooner

By John Whitmarsh
CW Staff

HOLLYWOOD, Fla. — "We waited too long," according to Henry Vazquez, senior vice-president at Hollywood Federal Savings and Loan Association here. "Our critical mistake was in not implementing audio response much earlier. As a result, we have a much more labor-intensive DP system than we should."

Vazquez was recounting his experience with the bank's terminal-based telephone payment service.

Hollywood Federal was one of the first savings and loan associations — and the third financial institution in the country — to offer its customers an electronic funds transfer (EFT) system. The bank, which runs 18 branches primarily in southern Florida's Broward County, brought its EFT system on-line in May 1975.

Bank after bank has since jumped on the "pay-by-phone" bandwagon. By the end of 1978, 170 financial institutions in 37 states offered such telephone bill-payer services, according to the U.S. League of Savings Associations.

Two Ways to Pay

Like many other bank telephone systems, Hollywood Federal offers two basic methods of payment.

Customers with Touch-Tone telephones can dial directly into the bank's IBM 370/148. The customer enters two items of information: his account number and his personal identification number.

An IBM 7770 audio-response unit acknowledges the information and then gives the customer step-by-step instructions for transferring funds and paying bills.

Using numeric codes from individually tailored vendor lists, customers identify the company to be paid and the amount and date of payment. After each entry, instructions are repeated so corrections can be made before the transaction is completed.

Alternately, customers can call one of the bank's 13 EFT specialists who will take the payment information over the phone and enter it in real-time via an IBM 3270 CRT terminal. This system can be used by customers who do not have Touch-Tone phones.

Dubbed Bill-O-Matic, Hollywood Federal's system began as a totally manual operation and remained that way during the first

(Continued on Page 34)

Terminal-Related Products Shown for End Users, OEMs

CHICAGO — The recent Interface '79 conference here featured many terminal-related products including end-user and OEM units [CW, April 16]. Among the introductions were four CRT terminals slated for OEM applications from Applied Digital Data Systems, Inc. of Hauppauge, N.Y. The units were designated the Regents 20, 40, 60 and 300.

The Regent 20 is a teletypewriter compatible "simply" display with upper and lower case characters and a 24 by 80 char. screen format. The CRT has incremental cursor movement and addressability and an auxiliary port. The terminal costs $995 in single units.

A conversational display terminal, the Regent 40 adds highlighting, a status line numeric pad and function keys to the capabilities of the basic Regent 20. The CRT costs $1,400.

The Regent 60 begins with features of the smaller displays in the line and adds buffered transmission and editing. It can transmit a character, a line or a page at a time and has bidirectional serial auxiliary interfaces. It costs $1,795.

A clustered intelligent terminal with 52K random-access memory (RAM), the Regent 300 has dual diskette drives, up to four CRTs, a printer interface and communications capabilities. A four-terminal configuration with these features costs $14,000.

The company also showed the System 75, a small system aimed at OEM users who program in Basic or Fortran. The system includes a microprocessor with 52K bytes of RAM, three dual-sided diskette drives, a parallel printer interface, communications capabilities and software.

Available from systems houses, the System

(Continued on Page 34)

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Exec Wishes Bank Switched to EFT Sooner

(Continued from Page 33)
year of operation. The installation of CRTs and operator assistants took the next two years.

Only last year did the bank finally upgrade to Touch-Tone service.

"If I had it to do over again," Vazquez said, "I would definitely offer Touch-Tone from the inception. But we did it all from scratch, and our early mistakes still haunt us."

Customer acceptance has been excellent, Vazquez noted. By the end of 1975, the first year of operation, Bill-O-Matic was paying 20,000 bill/mo. Three years later it was handling 120,000 bill/mo.

For 10 cents per transaction, customers have Touch-Tone access to the computer seven days per week. Operators are available Monday through Friday from 8 a.m. to 10 p.m. and on Saturday from 8 a.m. to 6 p.m.

What costs the customer 10 cents per transaction costs the bank 45 cents per transaction. Despite the apparent deficit, the system is cost-justified, Vazquez said. Bill-O-Matic alone has generated $35 million in net funds for the bank.

Hollywood Federal also offers other EFT services. Its "Plus Account" enables customers to make deposits, withdrawals or guarantee checks from local retail outlets. The bank operates terminals in 16 supermarkets and 24 discount drug stores.

Users Get More Products

(Continued from Page 33)
75 costs $10,500; the disk drive is an additional $1,800.

AT&T announced plans to make the 4540 terminal from Teletype Corp. available from local operating companies under tariffs to be filed in the third quarter. To be called the Dataspeed 4540 by local phone companies, the terminal has been available from Teletype Corp. on a purchase-only basis for some time.

Described as functionally equivalent to the currently available Dataspeed 40/4, the modular terminal will be offered with two controllers, a display, a keyboard and printer options. AT&T said monthly rates on the 4540 will range from $600 to $630 for a typical cluster of three CRTs and an 80-col printer.

Western Union Telegraph Co. introduced the Video 200 CRT for use with its Infocom message-switching system. The terminal includes text-editing capability and can operate at 100- or 300 word/min.

The CRT costs $244/mo on a three-year lease and will be available May 1, pending tariff approval. It also can be used for transmitting Telex, TWX and similar messages, Western Union said.

Printer, Interpreter

Other terminal announcements at the show included the introduction of the General Electric Co. (GE) Terminet 340 correspondence printer and the addition of a Basic interpreter to Compugraphic Corp.'s MDT-400 intelligent terminal.

Specified at 340 line/min, the GE printer uses a one-press carbon ribbon printing system that reportedly yields greater character density than conventional nylon ribbons, although a company spokesman declined to quantify the extent of the density increase.

The correspondence printer also uses a servo motor paper drive to improve printing alignment precision, the spokesman added.

Priced at "less than $6,000," the printer will become available this fall from GE's Data Communication Products business department at Waynesboro, Va. 22980.

As for the MDT-400, the recently added Basic interpreter allows users to enter mathematical, conditional, formatting and control commands from the keyboard of the Intel Corp. 8085-based terminal, a Compugraphic spokesman noted.

The Basic interpreter is available immediately for a $300 one-time license fee from Compugraphic at 80 Industrial Way, Wilmington, Mass. 01887.

Epicom, Inc. of Altamonte Springs, Fla., showed the Epibert 320-bit error rate tester. The unit costs $2,950 with first delivery scheduled for July 1979.

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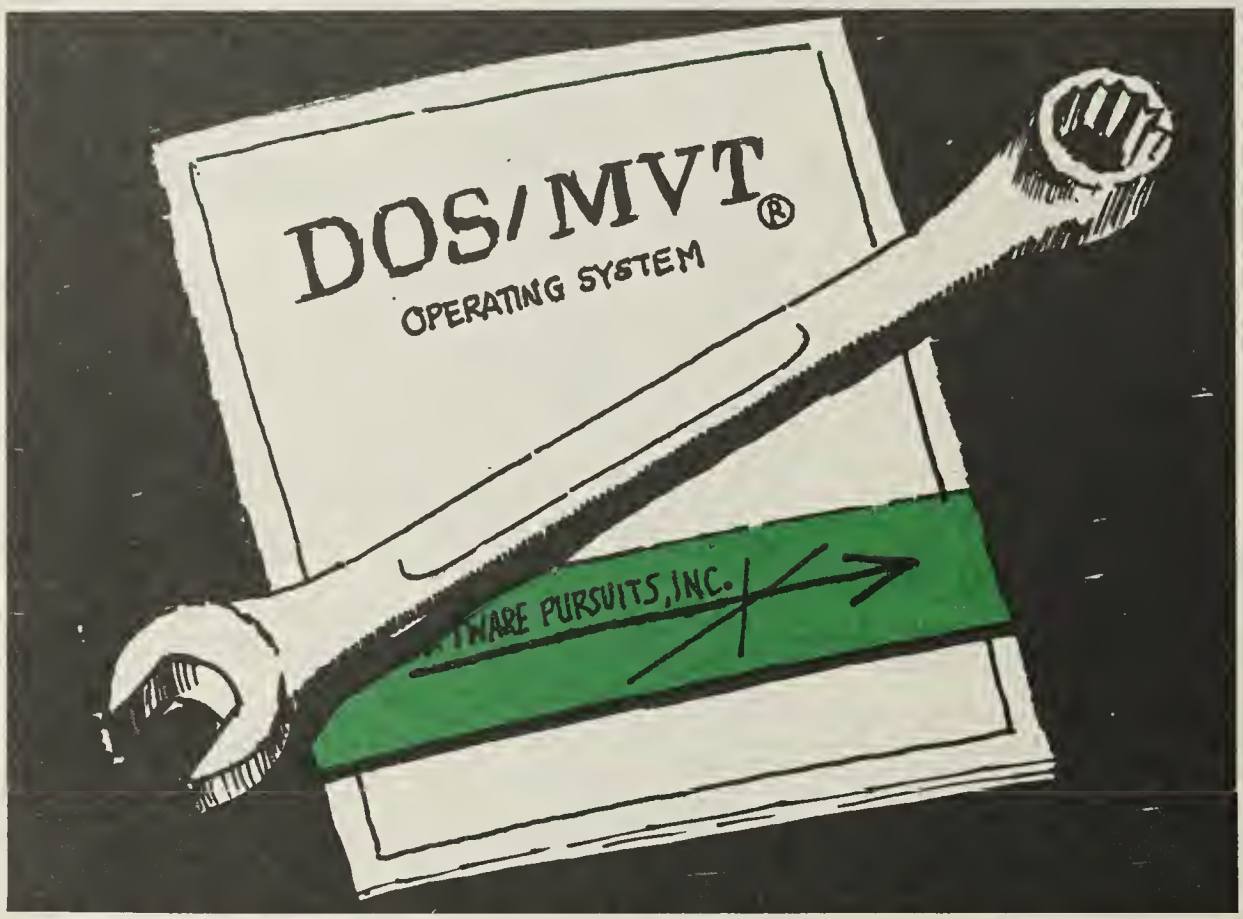

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Vendors at Odds Over Definition of DDP Net

By Ann Dooley
CW Staff

ST. PAUL, Minn. — Few computer users can agree on what it is that distributed data processing (DDP) networks actually encompass, and a group of DDP vendors here recently had the same difficulty reaching an agreement.

A panel of leading DDP vendors at the recent Computer Expo 79 here explained to attendees how their firms viewed DDP and found that all their explanations differed sligthly from each other.

According to Dan Klaers, systems engineer for Data General Corp., DG views DDP as a way of spreading data bases among several users having communications with a host processor. Multiple minicomputers, standard industry protocols with CRTs in a decentralized environment and hardware and software would be available to perform operations with standard languages, he explained. The system would be used by a large number of people at diffferent locations instead of only a few users, according to Klaers.

The corporate philosophy of Four-Phase Systems, Inc. concerning DDP is broader and less classical than the DG approach. Its systems consist of four functions including data entry, batch processing, word processing and on-line inqury to a mainframe at a distant location.

Four-Phase believes in incorporating a "family of systems," including software, to help the user, according to Vaughn Reistan, a branch manager.

Hewlett-Packard Co.'s DDP philosophy is to integrate various systems into a network for cost savings, Owen Bensen, a systems engineer, told the audience. The network system reduces the number of data communications problems in remote sites, he said.

Honeywell, Inc., on the other hand, believes that different systems are right for different users depending on their individual needs. Honeywell equipment can be configured in a number of ways or even configured to other vendors' mainframes, according to Grayce Booth, distributed sytems coordinator.

Mohawk Data Sciences Corp. looks at DDP as a user-initiated force for change, according to Mohawk product manager Bill Wood. Experienced users look at system prices and then at the low cost and ease of implementation involved with intelligent terminals and they opt for DDP, Wood said.

A terminal can be bought for a single application and then expanded if other needs develop, Wood said. Costs may be reduced but, more importantly, productivity will be improved. The systems must also be expandable so that greater capabilities in hardware or software can be added as needed.

Once a user decides to implement DDP, both the user and the vendor must analyze how much time is available for the implementation process, how many programmers will be needed, who in the company will be involved , what the data base will consist of and how it will be set up, according to Kip Farrington, Midwest district manager for Pertec Computer Corp.

Degree of Sophistication

The degree to which the user wants to become sophisticated must be considered, as well as the extent of the programming necessary to provide that level of sophistication.

In any implementation, standardization can be very important, Wood said. Various kinds of equipment can be detrimental to and inefficient for the user. Standardization among remote sites as well as standardized protocol and communication reduces errors, however, Wood noted.

Implementing a DDP system can often prove expensive, Booth warned attendees, but noted that it can also greatly increase efficiency. Few people really save money, but they stay competitive with others in their industry and keep up with the increased workloads. Survivability is the key, she added.

The vendors urged users to be cautious before selecting a system. When deciding whether to implement, the user should identify the problem, analyze what is wrong with the current procedure or process and talk to users and then their vendors about what can be done, Booth said.

Wood told users to "look a little longer than you think you need to before deciding."

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DG Extends Dasher Series With Buffered CRT

WESTBORO, Mass. — Data General Corp. has extended its Dasher terminal series by adding a combined interactive and buffered CRT that features a separate typewriter-style keyboard, a 12-in. screen and an industry-compatible asynchronous communications interface.

Compatible with both the D1 and D2 models, the Dasher D3 has a 14-key numeric data entry pad, a separate cursor-control keypad, 18 user-defined function keys and direct cursor positioning and sensing capabilities.

The unit also has a 96 upper and lower case Ascii character set and can be fitted with optional fonts and keyboards for international use, a spokesman stated.

Alphanumeric characters displayed on the screen are formed by a 5 by 7 dot matrix for upper case and a 5 by 8 matrix for lower case. A maximum of 24 lines, each having 80 characters, can be displayed on an individual screen, the spokesman continued.

For information highlighting and forms design, several character attributes can be predefined by the user to differentiate portions of the displayed text. Programmable character bulk, underscore, dual intensity, block fill, reverse video and protection functions can be selected individually or in different combinations.

Selectable Speeds

The terminal's asynchronous communications interface has selectable speeds up to 19.2K bit/sec, which may be independently set for reception and transmission. In addition, the unit can be connected directly to a central computer using the current loop interface with cables up to 1,500 ft in length.

The standard EIA RS-232C interface can be used for remote applications, the spokesman noted.

Buffered Mode

While in its buffered mode, the system offers text manipulation functions similar to those found on word processing terminals, DG said.

Single characters, words or blocks of information can be moved, inserted or deleted with a keystroke without intervention from the host processor, the spokesman claimed.

The Dasher D3 was designed to be used with DG's Eclipse, Nova or Micronova systems and costs $2,590. Quantity discounts are available from DG at Rte 9, Westboro, Mass. 01581.

"We upgraded to an Omega 480-II for the same reason we originally chose the Omega 480-I...

Leo J. Hertzog, Jr., Vice President of Operations (right) and Joseph A. Bitzer, President and Founder of Communication Concepts, Inc. (CCI), of Ivyland, Pennsylvania. CCI is a multi-million dollar direct marketing organization providing computer-based mail production services. One of Omega's first customers, they exemplify what the proper mix of technology, capital and management can do for a small business.

...it was the better business decision."

Bitzer: "First and foremost behind our decision was the company behind the product. You have to have the people there to support you."

Hertzog: "Most companies of our size have problems with financing and expansion. Having a partner like Control Data to help with these problems was a big factor in our growth."

Bitzer: "That's correct. Control Data was willing to install this equipment, help us finance it, and pass the investment tax credits along to us. And during the term of the contract we were able to upgrade to the larger cpu and expand our computer resource."

Hertzog: "Upward hardware and software compatibility were key. Omega 480-I gave us more throughput than a 370/138. With a field upgrade, our 480-II gives us more power than a 370/148. We're driving two laser printers (two more are on order) and 9 impact printers, using the latest releases of IBM operating software without modification."

Bitzer: "The computer is a revenue producer for us, so price/performance is important. Omega just gave us more value for our dollar than the comparable IBM mainframe. But it was more economical in other ways too. We figure it needs about half the floor space, a quarter of the power and a fifth of the air conditioning."

Hertzog: "From the technical side, Omega 480 is very good. But the most important reasons are on the financial side. It was just the better business decision."

Perhaps Omega 480 is the better business decision for you. Call 612/853-7600 or contact your local Control Data representative.

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Acoustic Coupler Links Systems Using Bell 103

SUNNYVALE, Calif. — Designed for voice-grade telephone lines and long distance direct dial systems, Tek-Com, Inc.'s acoustic coupler operates at 0 to 1,200 bit/sec or 0 to 300 bit/sec speeds and is compatible with computers and terminals using Bell 103 handshakes, the vendor said.

The Model TC3003 Hotline is structured to transfer data over unconditioned lines and incorporates a full set of test and system troubleshooting functions, the firm said.

No Limits

The unit meets EIA RS-232C and 20mA current-loop standards and is not restricted to character-oriented transmissions, a spokesman added.

The modem functions in an asynchronous, full-duplex mode and is cross-compatible with all acoustic couplers within the 0 to 300 bit/sec range.

The Hotline is priced at $695 from Tek-Com at 1147 Sonora Court, Sunnyvale, Calif. 94086.

AJ Lowers Price On Teleprinter

SAN JOSE, Calif. — Anderson Jacobson, Inc. (AJ) is offering lower lease and purchase prices for its AJ 630, a 30 char./sec dot matrix thermal teleprinter.

On a 12-mo lease, the AJ 630 is available for $70/mo, including maintenance. Quantity discounts and longer term leases are also available at reduced prices, the firm said.

The purchase price for the AJ630 is $1,600, with reduced prices for larger quantities.

AJ is located at 521 Charcot Ave., San Jose, Calif. 95131.

Bits & Pieces

Forms Tractor Attaches To Daisy Wheel Printers

SANTA ANA, Calif. — A forms tractor for Qume or Diablo daisy-wheel printers recently introduced in the U.S. by MQI Computer Products is said to provide continuous form feeding in both directions.

The tractors on the BDT Model FT210 engage the paper on both the in-feed and out-feed so it can be positively positioned in either direction.

The device clips onto the standard Qume and Diablo friction feed platens and is easily removable, a spokesman said. The unit costs $230 from MQI Computer Products at 2315 S. Otis St., Santa Ana, Calif. 92704.

Tabletop Forms Burster Designed for Smaller User

BARRINGTON, Ill. — A tabletop forms burster recently introduced by Uarco, Inc. can burst 70,000 or more linear in. of forms per hour, the vendor claimed.

The Model 2010 is a fixed-speed unit designed for lower volume users. Features include a static bar, adjustable rollers and a belt feed conveyor with independent operation for forms runout.

Up to 7,600 11-in. forms, 9,700 8.5-in. forms or 23,500 3.5-in. forms per hour can be burst with the unit. Forms burst on the unit can vary from 10-lb to 100-lb stock, a spokesman claimed.

The unit costs $1,975, Uarco said from W. County Line Road, Barrington, Ill. 60010.

Data Dis-Guard Stores Waste

WESTBORO, Mass. — A "night depository" for confidential waste materials that stores crumpled paper, microform and other media found in DP installations has been introduced by Security Engineered Machinery here.

The Data Dis-Guard is the same size as a four-drawer filing cabinet and is secured with a lock and key. Materials are placed in a slot in the top of the drawer section and collected in a bag beneath the slot.

A security plate built into the device closes when the drawer is opened or the cabinet is turned upside down, preventing efforts to "fish out" papers, the company said.

The $295 device is available from Security Engineered Machinery at 5 Walkup Drive, Westboro, Mass. 01581.

A $569,000 Misunderstanding?

By Howard A. Karten
CW Staff

CHICAGO — When the State of Illinois' Department of Administrative Services (DAS) acquired an IBM 3800 mass storage system (MSS), it did so in the hope of saving $329,000 a year. Inadequate research, preparation and training of users in DAS' Office of Management Information and Communications, however, caused a cost increase of $20,000 a month, according to Lisa Hall, an internal auditor with the state.

In the period of a year, the MSS would have cost the state $240,000. This figure, combined with the $329,000 the DAS hoped to save, added up to an additional annual cost of $569,000.

That $569,000 misunderstanding, which Hall discussed before the Ninth Conference on Computer Audit, Control and Security held here recently, reads like a textbook study of the dangers of acquiring advanced hardware — or indeed, any hardware — before a sound analysis has been performed.

Hall performed her audit — which she emphasized was only a financial audit — at the request of the director under whose administration the device was installed. That director has since departed of his own volition for another job, Hall stated, but the agency is stuck with a vastly underused piece of equipment. Hall was asked to do her study when the agency's cost did not drop as predicted and it realized that something was wrong.

The Heart of the Problem

Hall pinpointed three factors she believed to be at the heart of the problem. No one at any level of the agency was held accountable for the decision to acquire the system, the pay scales set by the state had resulted in an undersized, inex-

(Continued on Page 40)

Despite Flooding, Power System Gets 'Juice' to Firm's Mainframe

Special to CW

PORTLAND, Ore.— A distributed power system recently kept a company's mainframe going despite two minor floodings of its computer room.

The Powermobile system from Data Processing Power Corp. of Los Angeles was originally purchased by American Guaranty Financial Corp. to reduce expenses for electricians associated with reconfiguring or moving hardware around. The insurance firm uses an IBM 370/145.

In mid-January of this year, shortly after the system was installed, two inches of soggy snow fell on the city. "At about that point, the air conditioning installers had chipped a small hole in the floor above us and another in the roof above that to run copper tubing up to the condenser on the roof. The night after it snowed, it suddenly warmed up and that snow turned into two inches of water," Bob Ross, vice-president for DP, recalled.

"Apparently the hole in the roof didn't get covered because at 3 a.m. we found water streaming down into the computer room, all the cables and connectors under the raised floor lying in an inch and a half of water — and the computer running all this time as though nothing had happened. As far as I was concerned, the device had paid for itself then and there."

Second Soaking

As if one flood in the computer room wasn't enough, a few days later the incident was repeated. A hot water heating pipe broke in an adjacent building, draining into the computer room all night.

"By morning, the hot water was standing three inches deep around the cables," Ross said. Despite this, the system kept running.

The system kept operating because of the watertight, flexible cabling that distributes power from a central point to the peripherals, Ross explained. A conventional conduit-type of electrical system would have shorted out under these conditions, he contended.

Management initially was reluctant to install the movable power system, which represented an investment of $15,000 to $16,000 including the associated cables and plugs .

"One of those who was a bit skeptical at first about the idea agreed that it was definitely a good investment. The second time the water came in, he said it had paid for itself again," Ross said.

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The Miniframe comes with our largest instruction set ever. So OEM's with their own software have much more flexibility in design.

The Miniframe speaks PASCAL, the powerful new language for scientific, commercial, and system programming that most competitive systems still can't speak. And of course, it also speaks COBOL, FORTRAN and RPG II.

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Naturally, system houses want all the features OEM's do. And more.

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More operating systems, for example. Choose from VORTEX or our new SUMMIT—an interactive, multi-terminal system with transaction processing and data base management. It gives you easy editing, screen formatting, and documentation aids. Plus speedy, comprehensive program development.

System houses also think PASCAL is important. Because it's more efficient, easier to maintain, expand, and modify.

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OUR END USER CUSTOMERS KNOW WE DESIGNED IT JUST FOR THEM.

Take all the features we designed in for OEM's and systems houses and say ditto for the end user.

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Once again, SUMMIT, our new operating system, helps the end user handle transaction processing. Without any additional, expensive software. It's also the right answer for a multi-tasking, "fully-implemented" distributed processing system.

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In Europe, write Headquarters, Mini-Computer Operations, London NW10 8LS, England.

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Stand-Alone Unit Manages Microfilm Records

ST. PAUL, Minn. — A system for managing microfilmed documents, scheduled for introduction this week by 3M Co., links a microprocessor, several diskettes, a CRT and a 3M Page Search Reader/Printer in a stand-alone system said to permit users to rapidly file or retrieve microfilmed documents.

The Micrapoint System can keep track of documents in either a 16mm roll or cartridge format. Location data for each frame of the microform is stored on a double-density, removable diskette.

The diskette can index up to 85,000 documents which can be retrieved by any one of eight parameters, according to a spokesman.

Each frame of the microform is indexed with either alphabetic or numeric keys. The keys range from six to 20 characters in length.

To use the system, the operator inserts the relevant diskette and keys in the keys of the document being sought. The system displays the information on the CRT, and the operator can then direct the system to automatically display the frames in or out of sequence, the spokesman explained.

Use of the system is facilitated by a menu of functions that guides the operator through the task being performed.

In addition to retrieving documents, the user can change or delete index information, display all numeric terms in the index within a specific range, rename other files, index new documents working directly from film and perform several other functions.

The system sells for $25,000. The 3M Co. can be reached through P.O. Box 33600, St. Paul, Minn. 55133.

The 3M Micrapoint Microprocessor System

Card Reader Aids Security

GLENDALE, Calif. — A combined security access/data collection card reader, recently introduced by Rusco Electronic Systems, can be used to restrict access to sensitive areas, control door or equipment access or collect data from a variety of sources, according to the vendor.

The device, designed for OEM use, uses a credit card-size Rusco badge that can be encoded with up to one trillion different combinations, the firm claimed.

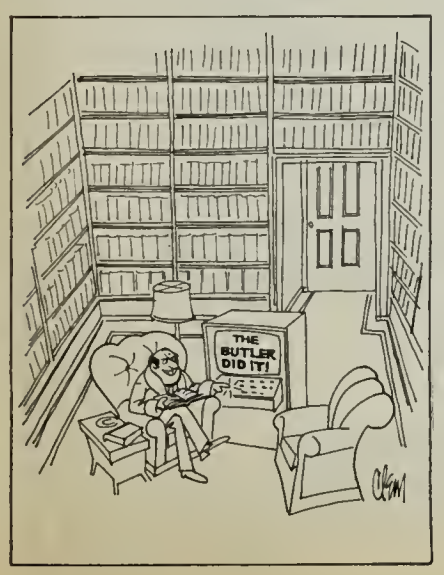
Data collected by the unit is transmitted at a factory-set rate of 1,200 bit/-sec, although other rates from 150- to 600 bit/sec are available on special order. The data is transmitted in Ascii format on a 20mA current loop.

The unit offers full-duplex communications capability. Up to eight individually addressed readers can share a single loop up to four miles in length, the firm noted.

In addition, users can attach a 12-button keyboard to further expand security or data collection.

The unit features a switch-selectable operating environment. In the poll mode, it stores data for transmission; in instant response mode, the data is automatically transmitted in real-time.

With a flush mount, the unit sells for $895, Rusco said from 1840 Victory Blvd., Glendale, Calif. 91201.



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Like most major brokerage houses, Hutton depended on outside time-sharing services for the bulk of their distributed data processing needs.

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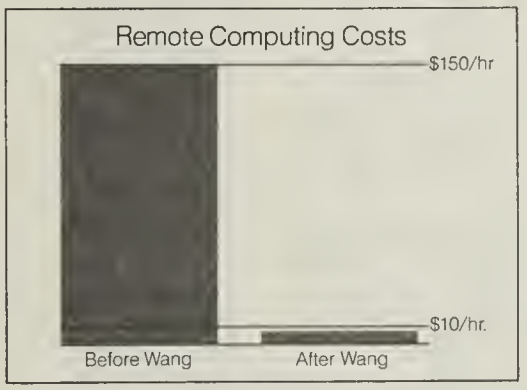
It was slow. And the more analysts who used it, the slower it became.

It was inflexible. If the central processing unit went down, all the terminals connected to it went with it. And while the problem was temporary, it was also troublesome.

Worst of all, it was expensive.

When Hutton's outside time-sharing cost reached $150 an hour in 1976, they decided it was time for a change.



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On Wall Street, E.F. Hutton is generally regarded as an innovator. And the Remote Computer Pool (RCP) Hutton's Management Information Systems Group created with Wang computers is the latest example.

Using Wang's interactive business computers, the MIS Group designed a computer cluster capable of handling a variety of data processing and analytical functions. And capable, through Wang's telecommunications technology, of servicing Hutton's entire brokerage staff nationwide.

Using Wang computers, E.F. Hutton has created a remote computer pool capable of servicing its entire brokerage network nationwide.

Now, when an analyst wants computer access, he gets it immediately. And since each Wang computer works independently, there are no down-time delays as there were with time-sharing.

What's more important, Wang computers have enabled Hutton to reduce its computing costs from $150 an hour to an almost unbelievable $8.

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System Delivers Data Fast for Western Union

ST. LOUIS — A data capture system has brought automation and improved productivity to Western Union's Money Order Processing Center here.

The center is responsible for capturing data related to money order applications completed at company offices or agencies as well as draft data that shows the recipient has completed the transaction, according to H.L. Loftis, director of the center. Currently, the center processes more than 30,000 documents daily.

"Draft application balancing is done on our mainframe systems, dual IBM 370/158s working in either 3780 or 360/20 emulation modes," Loftis said. The systems are located at Western Union's Mahwah, N.J., facility.

Prior to the installation of a Cummins-Allison Corp. Keyscan system, Western Union encoded source documents with necessary information in magnetic ink character recognition (Micr) code. For money order applications, this meant encoding the dollar amount, while drafts required encoding the 10-digit number corresponding to the application.

An outside subcontractor then scanned and transferred this data to tape for eventual mainframe processing.

Financial Constraints

John Kinder, Western Union's manager of systems and analysis, learned of the Cummins-Allison system while attending a DP conference.

"I doubted that any system was available to us within the budget parameters we faced," Kinder said. "Other changes were scheduled to take place within the immediate future that meant any alternative system had to break within a one-year period."

After an analysis, the company decided to implement the Cummins-Allison system. A Cummins-Allison 4400 system was installed in July 1975 and upgraded to a Series 5400 to meet increased demands.

Another factor in the decision was the desire to permit communications with Western Union's mainframe, allowing for mainframe processing at a remote location.

The present system consists of a 96K-byte processor, two 9.8M-byte disk drives, an 800- and 1,600 bit/in., 9-channel tape drive, a 1,000 line/min printer, a card punch, five CRTs, a Model 4216 reader/sorter with dual Micr and optical character recognition (OCR) read systems and a 9,600 bit/-sec communications controller.

Western Union found the system reduced the errors file. "We attribute the reduction in errors to the system's dual Micr/OCR capability to read documents both magnetically and optically," Kinder said. At the same time, in-house processing was reduced from eight days to two days since there was no need to utilize outside services.

"Our backlog situation was alleviated within six months," Loftis noted. "Essentially, we went from a manual system to a fully automated one."

Illinois Makes Costly Mistake

(Continued from Page 37)

perienced staff and auditors were not involved in the study from the start.

None of these conditions has changed since the MSS was installed, so a similar situation could recur, she contended.

The problems the state has encountered probably began with an inadequate collection and analysis of data on the number of tape mounts in the installation, Hall believes. The information originally collected to justify the decision was simply "seat-of-the-pants estimates" and was not backed by any hard data.

"The DP staff tried to cut corners in justifying the decision to lease the hardware," she noted, speculating that "they wanted a new piece of hardware to play with — that's the nature of DP personnel."

Compounding this, top management was not involved in the studies and therefore "couldn't assess the implications of the technology acquisition on the budget," she said. "DP people were making management decisions."

Vendor Involvement

In addition, IBM personnel were very heavily involved in the studies, perhaps infecting the DP staff with unwarranted enthusiasm, especially given the early — and incorrect — estimates of savings. "There has been a [very close] relationship between IBM and the data center — the IBM reps are there all the time," Hall noted, adding that they had indicated they were prepared to give a considerable amount of support to the effort.

The center was already a heavy user of IBM equipment, with four 370/168s, two 370/158s and a good deal of IBM tapes and disks.

"Beware of freebies" may be the lesson to be learned, she commented of the situation.

Much of the problem was caused by inadequate preparation of users for the conversion from tapes to the MSS, she theorized. A natural resistance to change compounded the problem.

As an example of this underuse of the hardware, Hall said that projections had indicated the device would be 50% filled 10 months after its installation. Instead, the actual usage after five months was only 12% of the estimate.

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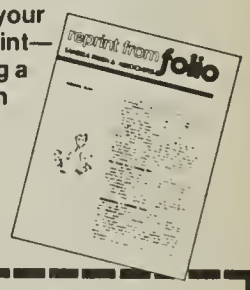

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Micro-Based Unit Joins CS Family

DG Adds CPU With Interactive Cobol

WESTBORO, Mass. — A multiterminal CPU with interactive Cobol has joined Data General Corp.'s Commercial Systems (CS) family.

The CS/30 is aimed at small businesses with up to 50 employees; it can also serve large firms as part of a distributed processing network, DG said.

The CS/30 Model 1 features a microprocessor with 64K bytes of main memory; one 10M-byte cartridge disk; a choice of printers ranging in speed from 60 char./sec to 300 line/min; a DG Dasher CRT console and interface; and a license to use the vendor's interactive Ansi 74 Cobol.

Options include a second 10M-byte cartridge disk drive; a 315K-byte diskette drive; IBM 2780/3780-compatible synchronous communications capabilities; and the ability to upgrade to the other CS/30 version currently available, the Model 3.

The CS/30-3 includes the same standard and optional features as the Model 1, but optionally supports up to an additional 32K bytes of main memory — bringing its total main memory to 96K bytes. This additional memory allows up to three active Dasher CRT terminals to be supported by the system, DG said.

Both versions of the CS/30 are program- and data-compatible with the entire CS family, according to the vendor. This compatibility reportedly extends from DG's Interactive Cobol Operating System (Icos), interactive Cobol language and communications capabilities down to all program levels and sequential, relative and indexed sequential access method (Isam) file levels.

Systems houses can develop the CS/30-1 and CS/30-3 into stand-alone business systems to perform typical accounting functions for smaller manufacturers and distributors, the vendor noted.

Disk Support

DG also announced support for one to four double-density 20M-byte cartridge disk as options on three CS/40 models — the CS/-40-C1, CS/40-C3 and CS/40-C5 — allowing up to 80M bytes of disk storage. There are five models of the CS/40 that offer disk storage capacities in the 10M- to 800M-byte range.

A CS/30-1 featuring a 60 char./sec receive-only Dasher TP1 printer and 57-in. cabinet costs $21,090. A CS/30-3 with 80K bytes of main memory, master Dasher CRT console and interface, an extra Dasher CRT,

(Continued on Page 43)

Two Systems From Honeywell Handle Factory Production Data

WALTHAM, Mass. — Honeywell, Inc. has announced a system to collect and process factory production data for management control and improved productivity. The Factory Management System is the first system by Honeywell to integrate terminals from its subsidiary, Incoterm Corp., with Honeywell Series 60 computers, according to a spokesman.

Comprised of two separate systems, the Factory Management System can reportedly function either in a free-standing mode or as part of a larger network in a distributed systems environment. One of the systems is a multifunctional data collection and processing system based on the Honeywell Level 6 minicomputer; the other is an SPD terminal processing unit-based data collection and concentrator system with communications capabilities.

While each operates under its own system and application software, the Incoterm Series 3000 data collection terminals are common to both.

Mini-Based System

The Level 6-based system is intended primarily for on-line transaction-oriented applications where data base manipulation at the local site is required or desired.

The mini operates in batch mode for such functions as work-in-process tracking and material status reporting. It can be connected to other Series 60 or foreign host computers to form a processing network, the spokesman noted.

The Level 6, with the Gcos Mod 400 operating system, is a multifunctional expandable minicomputer in which the processors, memories, communications equipment and peripherals can be selected to suit specific application requirements, the spokesman claimed. Cobol, Fortran and RPG are offered.

Operational support for the system's application packages is provided by the Factory Terminal Facility/6 (FTF/6) software through extensions to the Gcos operating system. The extensions allow the Level 6 to transfer information to and from the Series 3000 terminals.

The applications packages include production scheduling and control, inventory management, materials requirements planning and time and attendance report-

(Continued on Page 44)

DEC Disk 'Trade Up' Deal Offered

SUNNYVALE, Calif. — Users of Digital Equipment Corp. minicomputers can "trade up" their disk subsystems through the System Industries Trade & Exchange Co. (Site) here.

Site is initially directed at users of DEC's RPO6, RPO5, RPO4, RMO3 and RMO2 disk subsystems. Through Site, RP/RM disk owners can replace their units with a configuration that offers larger storage capacity and enhanced performance features, the broker maintained.

DEC users will get "attractive discounts" when they trade in RP/RM disk subsystems. "These discounts, coupled with the larger storage capacities users will get from [the broker's] disk systems, will result in substantial cost savings," a Site spokesman claimed.

Site also stands ready to sell DEC-maintained RP/RM disks at prices it said are far below those of new DEC equipment. If a user wants to buy a specific DEC unit, Site will register its name and the RP/RM model needed; the user will be notified when the equipment becomes available.

A user with two RPO6 units offering 400M bytes of storage could buy a third from DEC for about $35,000 whereas Site could provide a new 600M-byte subsystem to replace the RPO6s for less than half the DEC RPO6 tag, the spokesman stated.

Site is at 525 Oakmead Parkway, Sunnnyvale, Calif. 94086.

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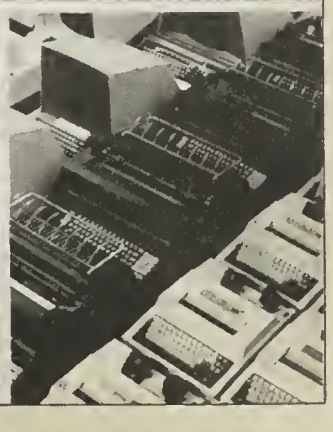

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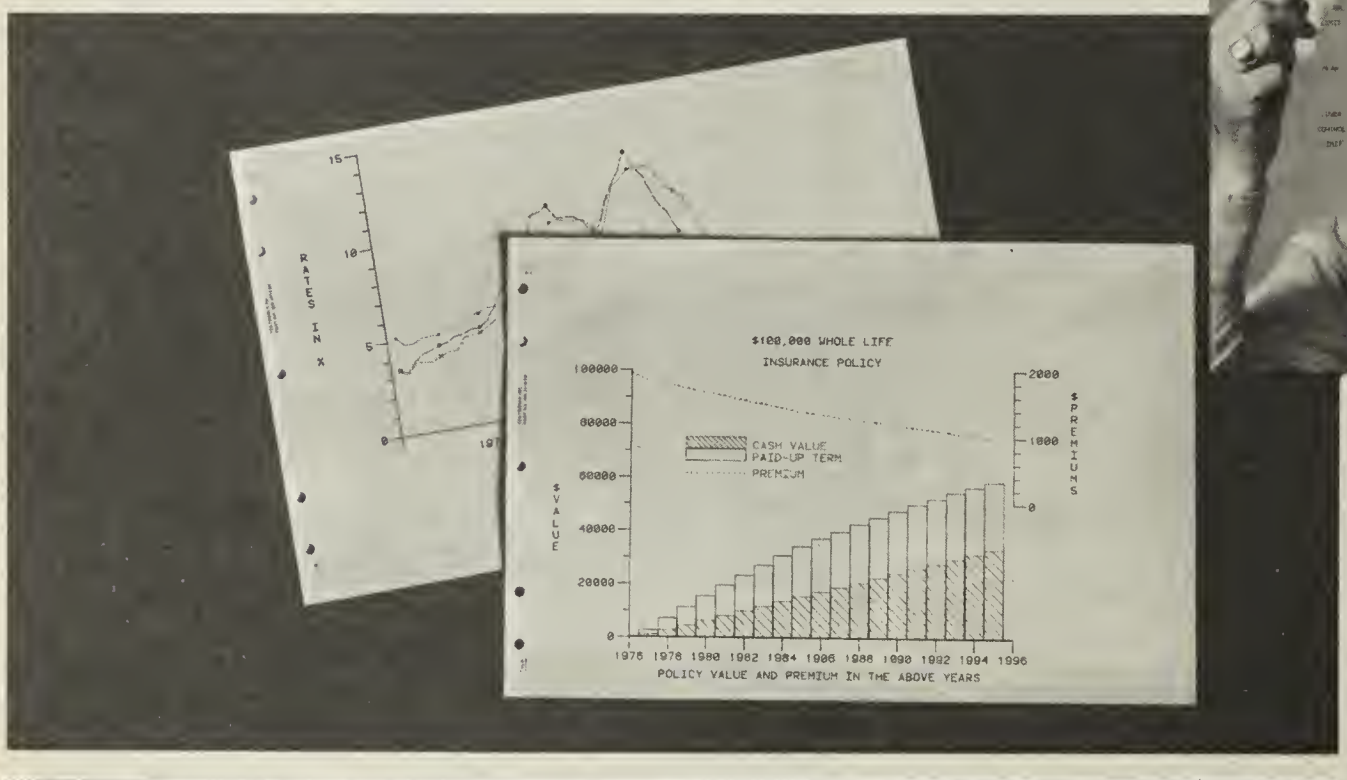
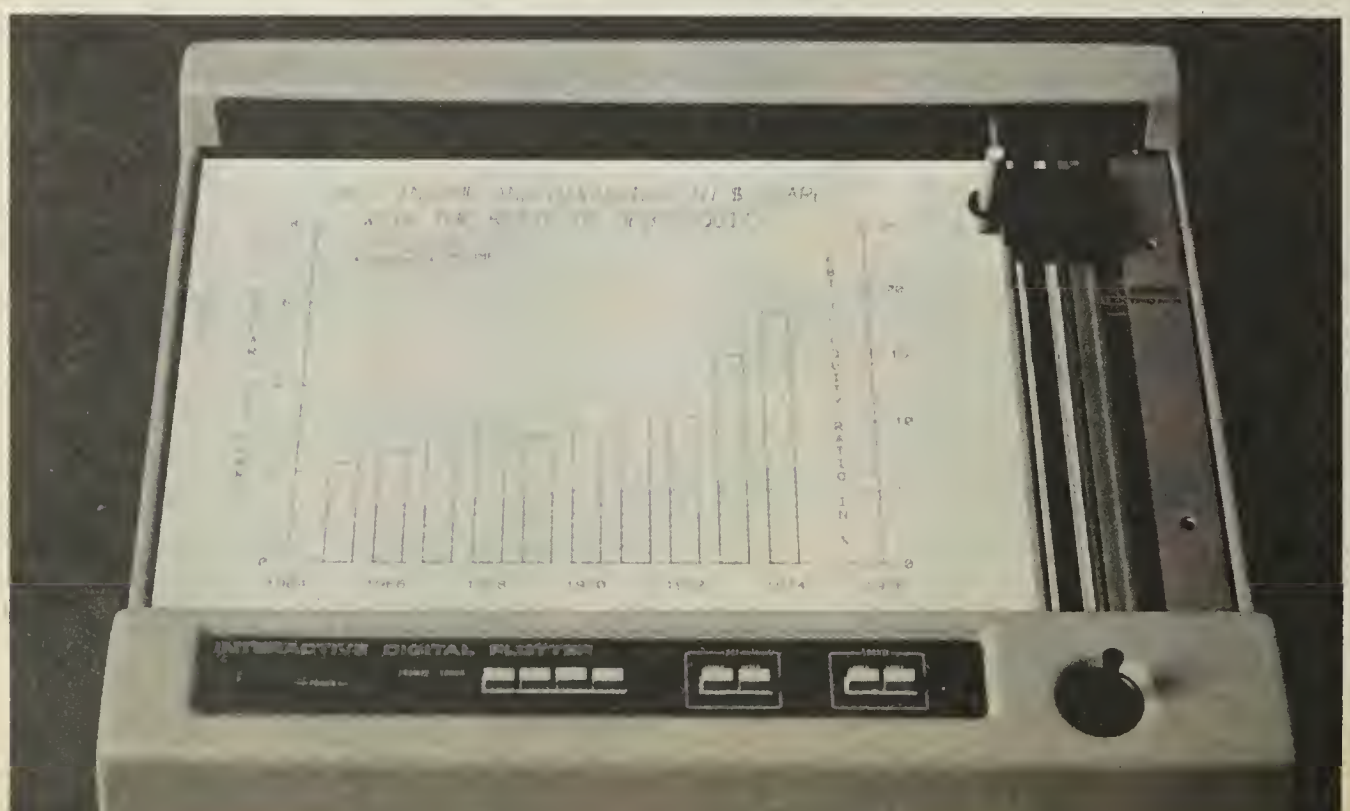


The 4662 can draw precise plots on paper or on acetate, providing an especially valuable graphic assist to overhead projectors.



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MDS Enhances Series 21, Cuts Add-Ons' Cost

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. (MDS) has extended the main memory of its low-end Series 21 distributed DP systems, slashed the cost of add-on memory for the series and introduced "concurrency software" for the System 21/20 and the System 21/40.

Both the entry-level System 21/20 and the System 21/40 now have basic memories of 48K bytes, expandable in 16K-byte and 32K-byte increments to 96K bytes. The 21/50's main memory is now 96K bytes, expandable in 32K-byte increments to 256K bytes.

For all Series 21 systems, the price of MDS' 16K-byte memory module was dropped from $1,175 to $585; the module's one-year rental fee fell from $28/mo to $14/mo.

The cost of the 32K-byte module was trimmed from $2,150 to $1,170; one-year rental of that module dived from $56/mo. to $28/mo.

The "concurrency software" allows simultaneous execution of programs in foreground and background modes, MDS said. Users of either the 21/20 or 21/40 with only one operator station will be able to run a foreground task, such as source data entry, concurrently with a background task such as communications, a spokesman explained.

Background programs that typically require little operator intervention will run on a virtual operator station under control of an actual station while that station remains free for interactive applications, he added. Once loaded, the background program executes automatically until further operator intervention is required.

A single-station 96K-byte System 21/20 with the concurrency software, two diskettes and communications costs $11,499 to purchase; it rents for one year at $296/mo.

A two-station 96K-byte 21/40 with concurrency, one diskette, a 10M-byte internal disk and communications costs $21,578 or rents for one year at $544/mo.

MDS is located at 1599 Littleton Road, Parsippany, N.J. 07054.

Disk Added For V70, V77

IRVINE, Calif. — Univac's Minicomputer Operations (MCO) has announced a 9.4 million-byte Disk Memory System for its V70 and V77 series minicomputers.

The system features random-access cartridge disk drive units. Up to four slave disk drives can reportedly be added to the system's controller to increase memory capacity in 9.34 million-byte increments.

The data transfer rate is 312,500 byte/sec, according to a spokesman.

Four controllers can be installed in a V70, V77-200, V77-400, V77-600 or V77-800 mini boosting total capacity to 149.76 million bytes, MCO said. All disk formatting is under hardware control to simplify disk system programming and operation, the spokesman noted.

The disk controller is contained on a single 7.75- by 12-in. circuit board that plugs into an expansion peripheral controller chassis, MCO added.

The Disk Memory System costs $11,000. Deliveries are expected to begin in the next few weeks, MCO said from 2722 Michelson Drive, Irvine, Calif. 92664.

DG System Offers Cobol

(Continued from Page 41)

10M-byte cartridge subsystem, 180 char./sec Dasher LP2 printer and 57-in. cabinet goes for $25,930.

A CS/30-3 with 96K bytes of main memory, master Dasher CRT console and interface, two extra Dasher CRTs, two 10M-byte cartridge drives, 300 line/min printer, synchronous communications line, the 2780/3780-compatible software and two 57-in. cabinets costs $49,820.

CS/40 configurations cost about $3,400 more with the 20M-byte subsystem. CS/30s and CS/40s with that much disk storage can be delivered within 90 days of order, DG said from Rte. 9, Westboro, Mass. 01581.

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The plotter controller utilizes a microprocessor to provide automatic detection and correction of transmission errors, local generation of alphanumeric characters, circular buffer memory, and greatly simplified host computer software. The controller can either operate the plotter remotely from a host computer or serve as a sophisticated computer interface - whichever fits your specific application.

For complete information on how the CPS-11 can upgrade your plotting capabilities for only $5,390,* call or write Houston Instrument, One Houston Square, Austin, Texas 78753. (512) 873-2620. For rush literature requests or sales office information, persons outside Texas call toll free 1-800-531-5205. In Europe contact Houston Instrument, Rochesterlaan 6 8240 Gistel Belgium, phone (059) 27 74 45.

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Two Systems Handle Plant Data

(Continued from Page 41)

ing. With these packages, the system is said to provide capabilities for on-line inquiry and transaction processing as well as collect all valid transactions for transmission to the host system. It also allows for updating work-in-process files and can produce current order status reports.

The core of the second system is the SPD terminal processing unit, which is a programmable controller that connects the terminals to the host for on-line or batch communications, the spokesman explained.

The unit can support up to 64 terminals and up to eight CRTs. Essentially a front-end concentrator for a host computer, it can be used in shops and plants remote from the host, but from which the flow of information must be captured quickly for management control, the firm said.

The software supports data collection, verification and recording functions and allows personnel with no DP experience to operate the terminals, according to Honeywell. Programming is in Adbasic, designed specifically for creating transaction processing programs.

Variety of Terminals

The Series 3000 terminals come in a variety of models. The Model 3305 labor-reporting terminal is a wall-mounted unit for collecting employee identification, work-in-progress, material flow, work status and other variable reports.

Honeywell's model 3102 and 3106 data entry terminals, usually located at shipping and receiving points, can access data banks in either the host or the Level 6 computer, the spokesman said. They are used for entering such variable production data as inspection reports, incoming inventory and inventory levels.

The Honeywell Model 3301 time and attendance terminal is a wall-mounted device designed to simplify employee badge reading.

Typical Configurations

A typical minicomputer-based system would be configured with the Level 6 Model 43 with 128K words of memory, two CRT terminals, a 10M-byte cartridge disk, 120 char./sec printer and 20 Series 3000 factory data collection terminals.

The 20 terminals include 13 Model 3305s, four Model 3106s, two 3301s and five terminal cluster adapters. The price of such a typical configuration is $116,600.

The typical configuration of an SPD-based factory collection system consists of the terminal processing unit, one CRT terminal, a dual diskette drive, 64K bytes of memory and a communications controller. This configuration is priced at $22,390.

The Model 3301 terminal costs $2,000; the Model 3102 costs $1,650; the Model 3106 costs $1,750; and the Model 3305 costs $2,440. Volume discounts are available on the terminals.

In the software department, FTF/6 costs $100/mo. The Factory Application Facility/6 consists of the Inventory Management System/6 at $80/mo and Production Scheduling and Control/6 at $100/mo.

The Gcos 6 Mod 400 operating system with communications and Cobol has a one-time license fee of $6,685.

Shipments are expected to begin during the fourth quarter from Honeywell's U.S. Information Systems Group at 200 Smith St., Waltham, Mass. 02154.

Prime Users to Meet

DENVER — The third annual National Prime Users Group Conference will be held here June 24-27.

Highlighting the conference will be keynote addresses by Prime Computer, Inc.'s president, Kenneth G. Fisher, and by Dr. John W. Poduska, Prime's vice-president of research and development.

The conference will feature a discussion panel composed of Prime senior management members as well as several technical and special interest presentations. Other events include the election of new officers and formation of ad hoc committees.

The conference fee is $90. Prime is located at 40 Walnut St., Wellesley Hills, Mass. 02181.

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Architecture	16-bit	16-bit	32-bit	32-bit	32-bit
DMA Bandwidth	2MB	6MB	8MB	26MB	2.5MB
Maximum Memory	256KB	256KB	4MB	1.87MB	2MB
Number of Registers	8	16	128	8	128
Direct Addressing	56KB	56KB	4MB	.5MB	32MB (virtual)
Writable Control Store	No	Yes (opt.)	Yes (opt.)	Yes (opt.)	No
Shared Memory Support	No	No	Yes (opt.)	Yes (opt.)	No
Pricing – Processor 256KB, PF/AR, Systems Console, Chassis and Cabinet	$29,700	$41,900	$33,500	$41,600	$70,000
256KB Expansion Memory	N/A	N/A	$10,000	$12,500	$15,000

	Optimizer Technology	Average Compile Time	Whetstone Benchmark	Matrix Inversion Program	Binary Search	Price *
3220 FORTRAN VII	Global	2000 LPM	2.25 Sec.†	3300 Sec.†	39 Sec.†	$ 88,600
VAX FORTRAN IV Plus	Block	1300 LPM	.85 Sec.	3700 Sec.	109 Sec.	$167,200

*Both 3220 and VAX configured with: 512KB, Floating Point, 10MB Disk, Dual Density Tape, OS, FORTRAN.
†Without cache memory option.

Visit Perkin-Elmer at the NCC, June 4-7, in New York.

Distributed Processing Seminars Set

CHICAGO — Three-day seminars on "Minicomputers and Distributed Processing" will be given in five major cities by the University of Chicago's Center for Continuing Education.

Sessions will cover the basics of distributed processing, minicomputer architecture, peripheral equipment, mini software, microprocessors, communications support, intelligent terminals and word processing.

George R. Trimble, president of T-Logic, Inc., will lead each seminar. Trimble has developed intelligent terminals and applications-oriented systems that use minicomputers.

He has served as a consultant in the use of minis and has written a number of articles for scientific and industrial publications.

The seminars will be held in San Francisco, May 14-16; Chicago, June 11-13; Toronto, July 23-25; Atlanta, Aug. 13-15; and New York City, Sept. 24-26.

Registration costs $545 per person plus $65 per organization.

To register or obtain more information, contact the MC Registrar at the University of Chicago, Center for Continuing Education, 1307 E. 60th St., Chicago, Ill. 60637.

Wire-Wrap Boards Plug Into DEC Micros

NEW BRUNSWICK, N.J. — A series of wire-wrappable boards plug-compatible with Digital Equipment Corp.'s LSI-11 and LSI-11/2 microcomputers is available from Garry Manufacturing Co.

The CIP2/11 (dual), CIP4/11 (quad) and CIP6/11 (hex) module boards are said to plug directly into the standard DEC Omnibus terminations.

The wire-wrappable boards reportedly provide 60 low-profile socket terminals per column with alternate rows of committed ground and voltage wire-wrappable terminals.

The boards will accommodate 55 to 165 16-position IC chips or an equivalent mix of 14-, 16-, 18-, 22-, 24-, 28-, 36- or 40-position DIL and LSI chips. Each of the boards is provided with one, two or three 40-pin peripheral stripline connectors.

The CIP series boards are available at prices ranging from $1.50 to $2 per IC position. Garry Manufacturing Co. is at 1010 Jersey Ave., New Brunswick, N.J. 08902.

Device Cleans Cartridge Disks In Three Minutes

ST. PAUL, Minn. — Two models of a disk cartridge cleaner, one for front-loading cartridges and one for top-loading units, will clean a magnetic recording surface in less than three minutes, according to their vendor, the 3M Co.

The Model 9100 (front) and Model 9200 (top) will remove dirt, dust, cigarette smoke particles, paper bits and oxide redeposits while leaving no residue, the firm said.

The reservoir of the cleaner uses 3M's CS-50 cleaning solution and pads that are placed on the cleaning arms of the unit for each cleaning cycle.

To clean a cartridge, the operator inserts the cartridge into the cleaner and pushes the "Process" button. When the cleaning cycle is over, the unit shuts off automatically, a spokesman said.

The cartridge cleaner costs $1,100 from 3M's Department DR8-21, P.O. Box 33600, 3M Center, St. Paul, Minn. 55133.

Printer Controller Built for LSI-11

SAN DIEGO — A line printer controller for Digital Equipment Corp. LSI-11 microcomputers is available from Datasystems Corp.

Called "completely software transparent," the DLP-1100 controller was said to fit Dataproducts Corp., Centronics Data Computer Corp. and DEC LA 180 printers or any printers emulating them.

The DLP-1100 includes dual in-line package (DIP) switches for addressing command status, data registers and vector registers, Datasystems said.

The controller costs $475 and can be delivered immediately, Datasystems said from 8716 Production Ave., San Diego, Calif. 92121.

Savings Statement.

Announcing major savings on TI's 820 KSR.

Here's a statement that's sure to rate high interest. TI has just lowered the cost for the OMNI 800* Model 820 KSR impact terminal.

Now, the impact terminal that offers you more features as standard equipment is yours for less. So, you can capitalize on the 820's speedy, 150 characters-per-second printing and quiet, less-than-60-decibels performance. And you can profit, too, from such user-oriented features of the 820 as the L.E.D. Terminal Status Control panel, Answerback Memory and its legible five-copy printing capability. The 820 offers these standard features and more at substantial cost savings.

At TI our prices are constantly taking a turn for the better. It's part of our philosophy. Through innovation and technology we are continually streamlining our manufacturing and production methods, reducing our costs while maintaining our quality standards, and passing on those cost savings.

Producing quality, innovative products like the 820 KSR impact terminal is what TI is dedicated to. And TI's over 200,000 data terminals shipped worldwide are backed by the technology and reliability that comes from over 30 years of experience in the electronics industry.

Supporting TI's data terminals is the technical expertise of our worldwide organization of factory-trained sales and service engineers. And TI-CARE†, our nationwide automated service dispatching and field service management information system. That's why TI has been appointed the official computing company of the 1980 Olympic Winter Games.

If you would like more information on TI's lower 820 cost, contact the TI sales office nearest you, or write Texas Instruments Incorporated, P. O. Box 1444, M/S 7784, Houston, Texas 77001, or phone (713) 937-2016.

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IMPLEMENTING SNA

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By Harvey A. Mayerowicz

IN DEPTH

The astonishing growth of teleprocessing has precipitated the need for a methodology to plan and install large-based data communications networks. This is especially true for IBM's Systems Network Architecture (SNA).

The proliferation of hardware and software functions has created considerable confusion in the DP community. A standard, coherent approach to SNA network planning and design can remove much of the trauma and frustration associated with this activity.

To develop an SNA network, planners must have in hand a long-range plan that defines the business direction of the company for two to five years. Such a plan should detail the activities of each major product-oriented area for that period and state both the expected generated revenues and the respective costs.

Each area in the company should receive a copy of the plan and consider it as its mandate. Each unit is then responsible for supporting the plan in accordance with its own particular function. This includes DP.

Any plan requiring network resources must be evaluated in this way. A data communications network should be configured to support the company's projected business lines. An understanding of the firm's business direction for the next two to five years is crucial to accomplishing this.

In addition, a statement of expected revenues and allotted expenses will help to define the scope and form of the required network. This dollar figure can serve as a barometer for gauging the resources and budget available.

In effect, the output from the business plan serves as a well-defined charter for DP.

Getting Under Way

With this completed, the SNA planning process can get under way. The major steps in planning a network include:

- Evaluating the technical options.
- Developing a corporate strategy.
- Establishing a network management architecture.
- Developing an installation/conversion plan.
- Conducting a post-installation audit.

Since this article deals with SNA planning, the assumption is made that the organization has already decided to use SNA. Therefore, the next activity is to study the technical options best suited to support the company's business needs.

During this phase, the network planners must focus on those business requirements vital to the operation of the organization. For example, the stock exchanges must have 100% availability during trading hours. This requirement is normally addressed by the introduction of redundant hardware in the network. The amount of duplication can range from allocating several spare modems and controllers all the way to completely redundant lines, 370X controllers and even CPUs.

Critical Requirement

As a second example, let us assume a manufacturer requires that the current status of an order and the products associated with it be on-line for an average period of two weeks. This requirement could be instrumental in the choice of the proper SNA access method — either the Telecommunications Access Method (Tcam) or the Virtual Telecommunications Access Method (Vtam).

Now two common methods for storing the order informating are a queue on disk or on a data base. If the manufacturer's organization has Tcam and has experience in coding Tcam applications, Tcam might be chosen because it provides queuing automatically.

On the other hand, if the organization does most of its on-line applications using IMS, then Vtam would be the appropriate choice. Until March 1980, IMS' only SNA access method will be Vtam.

Certain business needs affect both the location of the elements in the network and the extent to which they communicate with each other. The organization of a firm can have a significant impact on the configuration or topology of its network.

Many firms require a completely centralized network. The control of both the network and the data is located at a central point.

An airline reservation system is such a case. The airlines must accommodate requests from people in Los Angeles and Chicago for passage on the same flight to New York. Using current software, the information regarding this flight can be most easily maintained and accessed from a single site. A network of 3277 or 3278 CRT terminals is an example of such a centralized network.

Other companies prosper using decentralized processing. This type of processing includes a network of machines that emphasizes local, stand-alone processing. While local systems may be connected to the host or other machines, the amount of datasharing in the network is minimal.

Traditionally, the only dependency on other elements in the network has been for processing power. One example is a remote job entry (RJE) station that sends jobs to the host for execution.

The structure of the corporation can determine the use of a decentralized network. A mature, decentralized network might be found in a conglomerate that consists of several autonomous subsidiaries. All the susbsidiaries are in completely unrelated industries.

Each of these companies would have its own autonomous DP organizations and networks. The subsidiaries would communicate only infrequently with the holding company; for example, at the end of each quarter to post profit and loss statements. The

(Continued on In Depth/3)

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(Continued from In Depth/1)
decentralized approach can best reflect the autonomy vested in each subsidiary and the organization of the conglomerate as a whole. The 3770 family of RJE devices and Series/1 systems are frequently used as nodes in a decentralized network.

For Data Sharing

Many other firms require extensive processing at widespread geographic locations. However, unlike the decentralized companies, the information must be shared and available to many nodes in the network.

In this case, the allocation and distribution of the data within the network is as important as the independent processing power at the peripheral sites. In effect, this is distributed DP.

A nationwide retail firm is very likely to gain advantage from distributed processing. Let us assume that this retailer has divided the country into Eastern, Midwestern and Western regions. Each region contains charge-account data for only the people in its area.

The regionally stored data services 95% of the requests originating in its area. The economy and efficiency of a 95% hit-rate supports locating the data at the regional sites.

However, if a customer from Chicago is visiting San Francisco and wishes to charge a purchase, his account will be retrieved from the Midwestern region, updated and sent back.

If the Chicagoan's college-age son in Atlanta wants to charge another purchase on the same account on hour later, this new transaction can now be applied against the most current image of the family's charge-account record. In effect, the advantages of locally stored data do not compromise the need for sharing that data in an intermittent but timely basis.

Under SNA, this scheme could be implemented using the 3790 and 8100 family of devices.

Organizations with multiple data centers share a long-standing desire to back up one data center or CPU with another. This feature becomes vital when a company has one on-line system crucial to the functioning of the company. It provides emergency processing when either hardware or software incapacitates one of the data centers.

The product now available to provide this emergency backup is the Multisystem Networking Feature (MSNF) in Advanced Communications Function (ACF)/Vtam or ACF/Tcam. To provide the full backup, the crucial files must be sent periodically to the backup data center.

Many companies would consider this a worthwhile expense in return for the increased availability of their crucial on-line systems.

Corporate Strategy

The next major activity is to develop a corporate strategy for the network. This strategy is especially essential to developing an SNA solution.

The purpose of developing this network is to support the business direction of the company. This would be very difficult to accomplish if each division or each subsidiary mistook its particular needs for those of the entire corporation.

An organization's business goals represent a panoramic view of the company's needs and intentions for the next several years. Each major area in the firm is identified and analyzed. This panoramic view allows the company to formulate an overall business direction, specifying appropriate roles for each major entity within the company.

(Continued on In Depth/5)

SMALL SYSTEMS POWER

1980s Outlook for Small Mainframes

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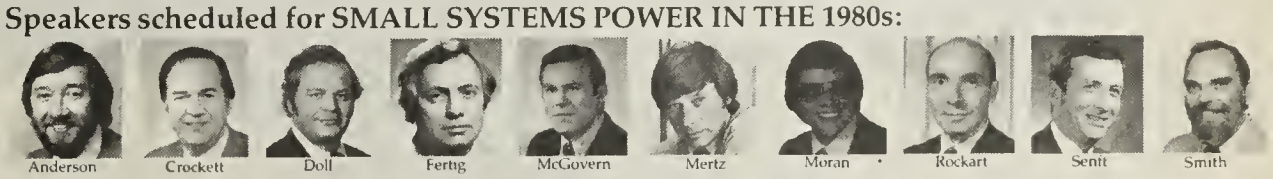
Small systems are no longer "mini" or "micro" in the power of usable memory, processor capability and versatility! This development has been obvious to industry observers for several years with the advent of the so-called superminicomputer, but now that IBM has put large system power in a small ("E" Series) mainframe in terms of size, cost per transaction, and total price, it's clear to the entire computer-using industry worldwide that small systems have arrived as a major force for almost every end user in the EDP environment!

Small systems haven't replaced big systems, they've amplified their power through communication networks and a hierarchy of new applications. This leverage has just begun, according to the panelists who will be assembled for SMALL SYSTEMS POWER to be held at the Boston Museum of Science, May 22 & 23. The full range of small systems from board oriented through E Series will be discussed by leading consultants, vendors, users and university authorities. SMALL SYSTEMS POWER IN THE 1980s will provide new insight as to the economics, risks and payoff of future small systems applications and technology.

SMALL SYSTEMS POWER in the 1980's" will address key issues such as:

- Accelerating price performance trends in small systems, as users get closer to the processing power provided by advanced semiconductor technology. Which vendors will give the best package?
- Big mainframe software tools such as data base management systems will "fit" into small systems. How will this impact the use of large mainframes?
- Re-decentralization of data processing and files may occur as branch offices and plants again reinstall their own system instead of terminals. How will central management control this data base proliferation?
- All mainframes in a network environment boost demands for economical, high speed, broad bandwidth data communications. How will the carriers meet this challenge?
- Plug compatible mainframes will cover the full range of the IBM product line. How will users sort out the vendors? What role will service organizations selling small mainframes play?

Speakers scheduled for SMALL SYSTEMS POWER IN THE 1980s:



Dr. Jared A. Anderson
President, Two Pi Corporation
Uses of IBM Compatible Minicomputers in DDP

Alan Baumgartner
Director of Strategic Planning
National Semiconductor Corp. Systems Group
Impact of Semiconductor Technology in the Computer Room

David Crockett
Program Manager, Advanced Computer Systems, Hewlett-Packard Corporation
Impact of Silicon-on-Sapphire Technology on Small Mainframe Performance

Dr. Dixon Doll
President, DMW Associates
Communication and Data Base Opportunities in Small Mainframes

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John Rockart
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(Continued from In Depth/3)

Sometimes, a certain segment of the corporation will develop the most cost-effective solution for its specific requirements, but the cost of fitting this solution into the entire coprorate network may well exceed the savings for the individual segment.

A branch in an insurance company might discover that a distributed processing approach would provide the most inexpensive solution to its processing needs. However, if the entire network is currently centralized, the cost of integrating this solution into the present configuration would easily offset the savings at the single site.

A corporate view of the network allows the network to be organized around the business direction of the company. Without the corporate strategy, the separate areas in the company could choose to develop network resources for products that are not in the company's strategic product line. At the same time, these areas might not allocate the resources necessary to develop the new products vital to the company's business direction.

This can happen to new products that are not projected to generate profits during the life of the current long-range plan. The area in charge of supporting the new product will be tempted to deploy its resources in favor of products that presently generate more revenue. However, the new product may represent a major corporate direction that extends through the period of the next long-range plan.

Products in high-technology sectors like fiber optics or new memories represent items requiring long-term investment. Yet they can shape the future of the companies involved. A high-level view could prevent such deviations from the corporation's goals.

Managing Body

Once the physical network has been designed to fit the corporate strategy, an organization must be developed to manage and operate the network. The choice of this organization is really part of the corporate strategy. However, this activity is so essential to an SNA network that it merits separate attention.

The current state of teleprocessing can be summed up by two observations. First, the ratio of on-line applications to batch has been increasing rapidly. Second, more and more on-line applications have been made available to the user community.

These two points have helped to create expectations for service levels consistently higher than before. In short, as the network improves its service to the user, the user becomes more intolerant of slowdowns and outages. Users used to be thrilled with 80% availability. Now, the network community has been observed to complain about 95% availability.

This "Frankenstein" syndrome will probably get worse before it gets better. The only alternative DPers have is to develop a way to manage and control the network.

The structure of SNA gives us a clue to an effective approach. One of its prominent features is its symmetry. This is, SNA has placed responsibility for its major functions throughout the network. A similar approach is also required for managing the network.

This results in what can be called "network management architecture." Currently, in many networks, all the decisions about the availability and allocation of resources are made at the central site; however, it would be better to spread this responsibility throughout the network.

The debugging or repair of phone lines in Oregon should not be undertaken by teleprocessing personnel at the home office in Chicago. Instead, the Western region should have a

(Continued on In Depth/6)

NOTICE OF INTENTION TO ISSUE RFP

Scenic General Hospital, a 134-bed acute-care facility, is preparing to release an RFP document for installation of a computerized hospital information system. The hardware and software system must provide for census, outpatient registration, billing, accounts receivable, and financial reporting (that meets CHFC requirements). Parties interested in being added to the RFP distribution list should submit company name, address, and phone number to: Stanislaus County Purchasing Agent, 1100 "H" Street, P.O. Box 3229, Modesto, California 95353 (Telephone: (209) 526-6319). The RFP is expected to be released on or about Friday, April 27, 1979. This notice is not a request for proposal.

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IN DEPTH

(Continued from In Depth/5)

group of people to solve this class of problem. If the portion of the network serving that region is large enough, perhaps an additional group to handle the Pacific Northwest might be even more effective.

End User's Viewpoint

Another prominent feature of a network management architecture is that the network is seen through the end user's eyes. Too often, networks are measured from the central site.

Assume a company's goal is to have the CPU and the 370X available 95% of the on-line hours. Unfortunately, a major section of the network could be down half the day because of line problems, without affecting the availability of the CPU and the 370X at all. Management would assume that the service to the user has been excellent. If this problem were to recur on an ongoing basis, management would be shocked to learn of user dissatisfaction.

This scenario has occurred at more than one company.

If measurements were made at the user's sites, a clearer, more accurate picture might emerge.

Another example is the measurement of response time. Many companies attempt to keep extensive performance figures for the network. To aggravate the situation, these response time figures are given to management.

Needless to say, a two-second CPU internal response time can stretch to a 10-second response time for the end user. When the 10-second figure is delivered to management by the user community, the results are heard in bewilderment, if not disbelief.

This tumult could have been prevented. After all, the purpose of the network is to provide a service to the end user. Therefore, the delivery of that service is the ultimate measure of the network.

The two points mentioned above present an introduction to the concepts of a network management architecture. They were chosen as examples because they show the reasons for calling this management approach an architecture. Each example highlights the need to allocate and deploy resources according to the processing needs in the network. Proper use of a network management architecture will provide more consistent support for the smooth processing of information throughout the entire network.

Conversion Process

Up to this point, the activities have focused on the business and support requirements for the network. When these issues have been resolved, the next major activity is to plan, install or convert to an SNA network.

The initial task is to define the goals of the implementation process. Meeting the deadline date for the installation is an obvious goal. The other goals might not be as apparent.

Sometimes, a set of operational parameters might surface as significant goals. For example, the company might require that the new network provide the same availability as the current network from the first day of the actual conversion. Some firms might demand a minimum acceptable response time from the first day of production. However, each of these goals must be measurable.

The relative success at achieving these goals will determine the success of the implementation project. In fact, the attainment of these goals will often determine the success of the entire network development process.

After identifying the implementation goals, the company must select its installation approach. This undertaking will require extensive research by one or more first-rate technicians. The objective is to identify the software and hardware options best suited for the smooth functioning of the network.

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ration, the task of handling network errors might require an inordinate amount of the network operator's time. In this case, the selection of an automated network operator program to monitor and correct network problems would be a suitable option.

The systems programmer or teleprocessing analyst will then need to identify the functions required for this automated network operator program. Having compiled the list of requirements, he must study the available choices.

For a Vtam-based network, IBM supplies two such packages: the Network Operator Support Program (Nosp) and the recently announced Network Communications Control Facility (NCCF) available with ACF/Vtam Release 2. If these offerings are inadequate, the technician may choose to write a Programmed Operator Facility (POF) using Vtam's Programmed Operator Interface.

Error-Recovery Facilities

The determination of network error-recovery facilities is a fundamental concern. An oversight in this area can create ongoing difficulties for the life of the network. Therefore, the research and evaluation of the error-recovery facilities must be scheduled very early in the formulation of the implementation process.

The choice of error-recovery facilities is just one feature that must be studied. The technicians must thoroughly investigate all the options critical to the success of the network. The result of their research should be a list of alternative approaches. The strengths and weaknesses of each respective approach should be detailed, and management must then choose based on the technical recommendations.

Testing Variables

At this point, all the technical options and features should have been selected. The testing and installation of all the options must now be combined into a coherent installation plan.

A concept used in scientific experiments is useful here. Scientific experiments attempt to identify the variables under investigation. Each variable is then tested while keeping all the remaining factors constant.

The same concept is valid for network development. The important variables must be identified. Then each must be isolated as the only variable in a given test.

If a new 370X is to be tested after delivery, it should be tested for hardware stability by using the current 370X software. If the current 370X software is the emulation program, then this should be used, not the Network Control Program (NCP). The variable under investigation is the 370X hardware. Every other variable including software, should remain constant.

The concept of isolating variables can be taken one step further. If the purpose of this test is to verify the 370X hardware, then only currently operational hardware should be attached to the 370X for this test. In other words, each class of hardware — or sometimes even each piece — must be treated as another variable and, as such, should be tested separately.

Testing the variables in the appropriate sequence can be seen as a critical path. One such path is to test all new hardware with current software; test the access method and support utilities in the CPU using local devices; test the 370X with the new software and currently operational hardware; test the new terminals and controllers with the 370X and currently operational software; and test each new line with all the new software and hardware.

Each of the above steps has isolated one hardware or one software variable. Any problem in each of the steps should be attributed to the variable under investigation.

Another useful vehicle is the division

(Continued on In Depth/8)

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IN DEPTH

(Continued from In Depth/7)

of the project into phases. A network implementation project is frequently a lenghty undertaking. By dividing the project into several phases, management can exercise more precise control over the implementation. Each phase will have its own deadline. As a result, the project can be tracked and controlled in a more timely manner.

Each phase should be responsible for a set of logically related tasks. In the steps mentioned above, a given phase might include all the hardware tests using currently operational software.

A more representative example of the first phase of a possible implementation is as follows; create project log and tracking methodology; introduce and test new hardware; familiarize personnel with skeletal IMS/Vtam or CICS/Vtam system; write simple one-function Vtam programs; and develop monitoring and testing tools.

This phase is meant as an initiation into the SNA world. The activities become building blocks for the succeeding phases.

Each of these activities is further broken down into detailed task lists. Individual tasks will be assigned due dates, and the sum of the times allotted for the tasks will constitute the deadline for that phase.

One last issue should be addressed in the implementation phase: the necessity of developing fall-back positions. While applicable to installing new networks in some very specific cases, the fall-back mechanism is especially significant for companies converting to SNA from an existing network.

During the actual conversion process, the network is extremely susceptible to problems with the new hardware and software. Relying entirely on the new configuration may jeopardize the work of the user community.

Therefore, to prevent a potential paralysis of the network, it would be best to plan for a back-up configuration during the cut-over period. This may require the use of T-Bar, Inc. switches, patch panels or even redundant hardware for the duration of the conversion. In many instances, this is an inexpensive alternative to extended outages.

Final Activity

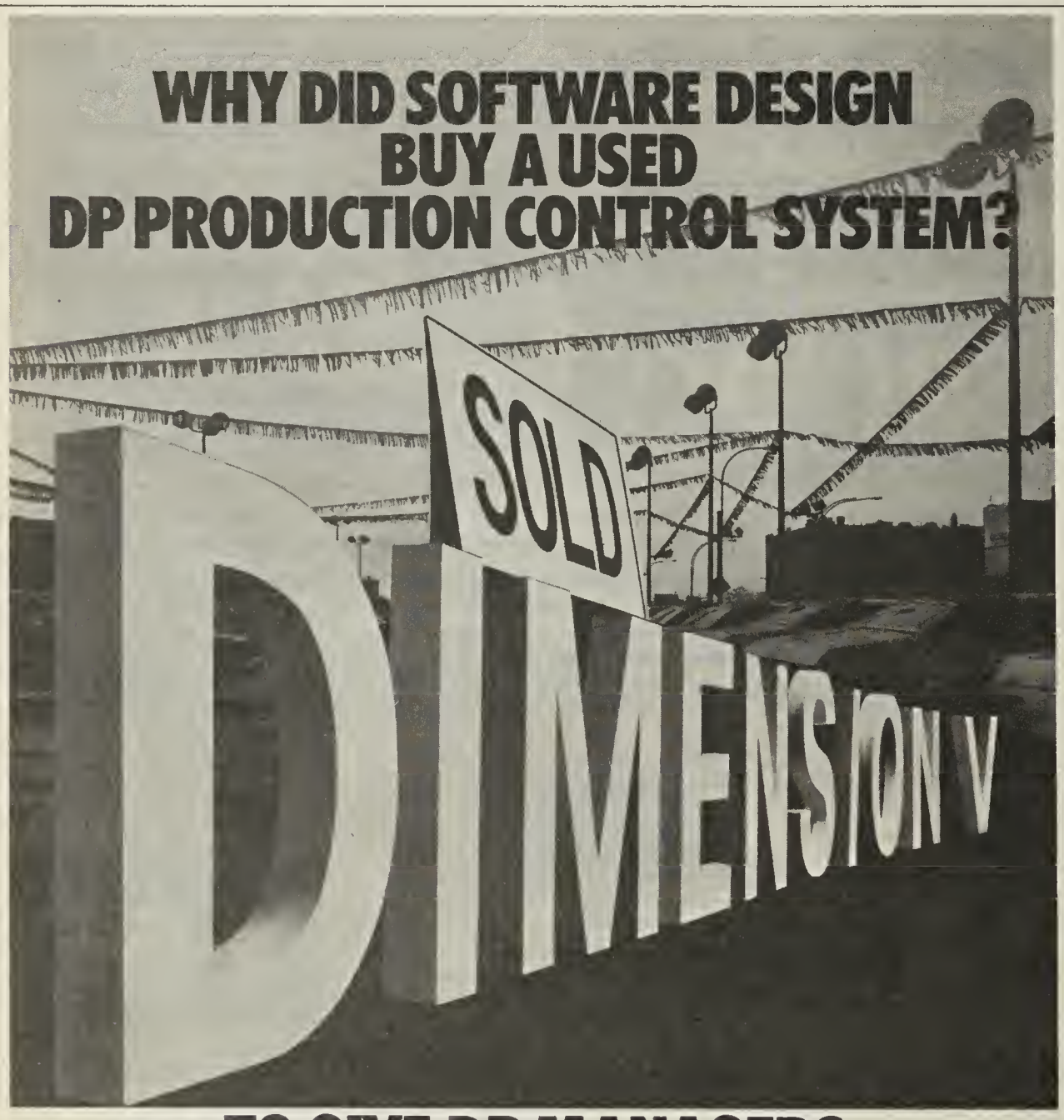
The final major activity in the network development process is the post-implementation audit. The purpose of this activity is to measure the success of the installation.

Recall that the goals defined for the implementation were measurable. For example, assume the goal of the error-recovery facility is to involve the operator in no more than 5% of the error-recovery decisions.

During this review, the figures will be compiled to measure the percentage of operator involvement. If the selected approach is not effective, then remedial action can be proposed. This review process also provides the opportunity to evaluate problems that were not originally included in the plan.

Some activities are difficult, if not impossible, to anticipate. The expertise of the people throughout the network may not be as great as was originally estimated. Therefore, new procedures or software might be necessary to assist them. The postimplementation audit is the appropriate time to discover these problems and provide quick, effective solutions.

Mayerowicz, a management consultant for Software Architects, Inc. of Chicago, has recently been active in SNA planning. He has also been a guest lecturer at Northern Illinois University's graduate school of computer sciences and is a former chairman of the DDP Management and Performance Committee at Guide.



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COMPUTERWORLD

Micro Launches Career for High Schooler

By Ann Dooley
CW Staff

DALLAS — What's left for a 17-year-old to accomplish after he's invented a product that reduces a house's heat loss by as much as 25% and started his own company with a microcomputer to instruct home builders on energy savings?

College, of course, is what's left. Nicholas Naumovich Jr. hopes to major in business and computer science while still finding time to run Parsec, Inc.

Naumovich first became interested in computers when he needed to plot the paths of solar and lunar eclipses and found that computer calculations were much faster and more accurate than manual methods. Using his father's Imsai Manufacturing Corp. 8080 microcomputer, Naumovich next turned his interest to energy studies.

Prize-Winning System

The Lake Highlands High School student won second place in a contest at last year's Personal Computing Show, held at the National Computer Conference and sponsored by the American Federation of Information Processing Societies, with a computer system he developed to perform energy studies on the efficiency of home insulation.

Using the 8080 as well as a Perkin-Elmer Corp. Model 1100 CRT on loan from the company, the high schooler designed his winning entry and chose the Model 1100 as his prize.

Naumovich's system now includes the 8080, the Model 1100, a Teletype Corp. Model 40 printer and two CII-Honeywell-Bull disk drives with 10M bytes each. His programs are written in Basic, and the system runs under the FDOS operating system.

As a basis for his computer program, Naumovich used the Texas Power and Light Co's. audit rating system, which determines the billing rate for a particular house based on its energy efficiency. Naumovich took these variables and incorporated them into his computer program.

After inputting data on house size, location, number and size of windows and doors, types of walls and their thickness, the amount of dead air space between walls, as well as payback periods on the cost of insulation installed to lower home heating and cooling costs — a factor that the utility company doesn't take into account — he can provide comprehensive energy reports for homeowners and builders. What takes the utility company about three hours to calculate takes Naumovich less than 20 minutes with his microcomputer, he said.

After making evaluations of a number of test houses, Naumovich discovered that air infiltration is the most common threat to efficient home heating and cooling. So Naumovich used his system data as a basis for inventing Thermo-Brite, an insulation material that reduces air infiltration.

Thermo-Brite is an aluminized film backed by pressure-sensitive adhesive that is placed on the exterior sheathing of a home before the brick or wood is put up, Naumovich explained. The aluminized film reflects heat back inside in cool weather and keeps cooling costs down during the summer.

Naumovich claims that he can reduce heating and cooling costs by as much as $800 a year with Thermo-Brite. He uses his Imsai microcomputer to input data from the energy audits to determine how much money can be saved in a particular house.

Naumovich has attended several homebuilder and computer conventions and uses his Imsai to demonstrate his energy-saving program to attendees.

He plans to attend this year's NCC to demonstrate his program.

Nickey Naumovich poses with the terminal he won for his energy auditing system at the '78 NCC Personal Computing Show. The table is draped with Thermo-Brite, an insulation material Naumovich invented with the help of his energy audit data.

Fairchild Offering PEP System For Single-Chip F3870 Series

MOUNTAIN VIEW, Calif. — Fairchild Camera and Instrument Corp. has introduced a microcomputer board that can be used as an evaluation and development aid for the complete F3870 family of single-chip microprocessors.

The prototyping, evaluation and programming (PEP) system allows a user to write programs and debug both hardware and software for F3870, F3872, F3876 and F3878 single-chip microprocessors. It provides real-time in-circuit emulation of all those microprocessors through a 40-pin umbilical cable.

The system, targeted for industrial, educational and home applications, can also be downloaded from a cross-assembler running on an existing microprocessor system, a spokesman noted.

The PEP system includes an on-board keypad and six-digit LED display that allows entry of data and simple programs for execution in the emulation logic without using a terminal. PEP can also communicate with an RS-232C or current-loop terminal at 110- or 1,200 bit/sec and support a high-speed paper tape reader for rapid program loading, according to the spokesman.

The system includes 2K bytes of 2114 static random-access memory (RAM), which is expandable on board to 4K bytes. The 2K bytes simulate the F3870 2K by 8 read-only memory (ROM) and the 4K-byte expansion allows simulation of the 4K by 8 ROM of the F3872 and F3878, as well as the F3876's additional RAM.

The PEP system, priced at $450, is now available in preproduction quantities; production quantities will be available in May. The PEP system costs $450. Fairchild's MOS Products Division is at 464 Ellis St., Mountain View, Calif. 94042.

Z80 Emulator Permits Testing Of Hardware and Software

KIRKLAND, Wash. — A stand-alone Zilog, Inc. Z80 emulator from Applied Microsystems has been announced to provide testing and troubleshooting for user software and hardware. The EZ-80 plugs into the target system's Z80 CPU socket to provide program control and diagnostic features, according to the firm.

The emulator provides real-time run trace of the target program. It can be plugged into any Z80-based product with no restrictions on memory addressing or programming technique, a spokesman claimed.

Basic features include real-time run and single-step and dual breakpoints. A trace memory, which captures all target program activity for forward or backward review, is organized as 255 words by 32 bits.

Contents of the 19 Z80 CPU registers are readily available for examination; the contents can be easily changed to new values at any time, the spokesman said.

The unit contains built-in diagnostic routines that include memory tests and scope loops. The user enters the address range that he wishes to test, followed by one of nine "code" functions. The user can also write his own programs and plug them into the 2716/2732 socket if desired.

The EZ-80 comes ready to use, with no additional equipment required, for $2,295, Applied Microsystems said from 11064 118th Place N.E., Kirkland, Wash. 98033.

North Star RAM Unit Doubles Memory Density of Horizons

BERKELEY, Calif. — North Star Computers, Inc. has introduced a 32K-byte random-access memory (RAM) board, doubling the memory density of the standard version of its Horizon microcomputer.

The RAM-32 runs at full speed in conjunction with the 4 MHz Zilog, Inc. Z80A microprocessor, as well as with Z80 and 8080 processors, a spokesman noted. Offered with the Horizon computer, it is also available separately for use with other S-100 bus computers.

One feature of the RAM-2 is parity checking so the memory board constantly diagnoses itself. Addressability of the RAM-32 is switch-selectable in 8K-byte regions.

The board allows users to configure a Horizon with 48K bytes of RAM by using one 16K-byte North Star RAM board and a RAM-32. A Horizon with 56K bytes of RAM can be configured with two RAM-32 boards utilizing three of the four 8K regions.

The RAM-32 is available in kit form at $599 or assembled, tested and burned in at $659. The Horizon with one double-density disk drive and 32K bytes of RAM costs $1,849 in kit form and $2,099 assembled. With two double-density disk drives and 32K bytes of RAM, the Horizon costs $2,249 in kit form and $2,549 assembled.

North Star Computers is at 2547 Ninth St., Berkeley, Calif. 94710.

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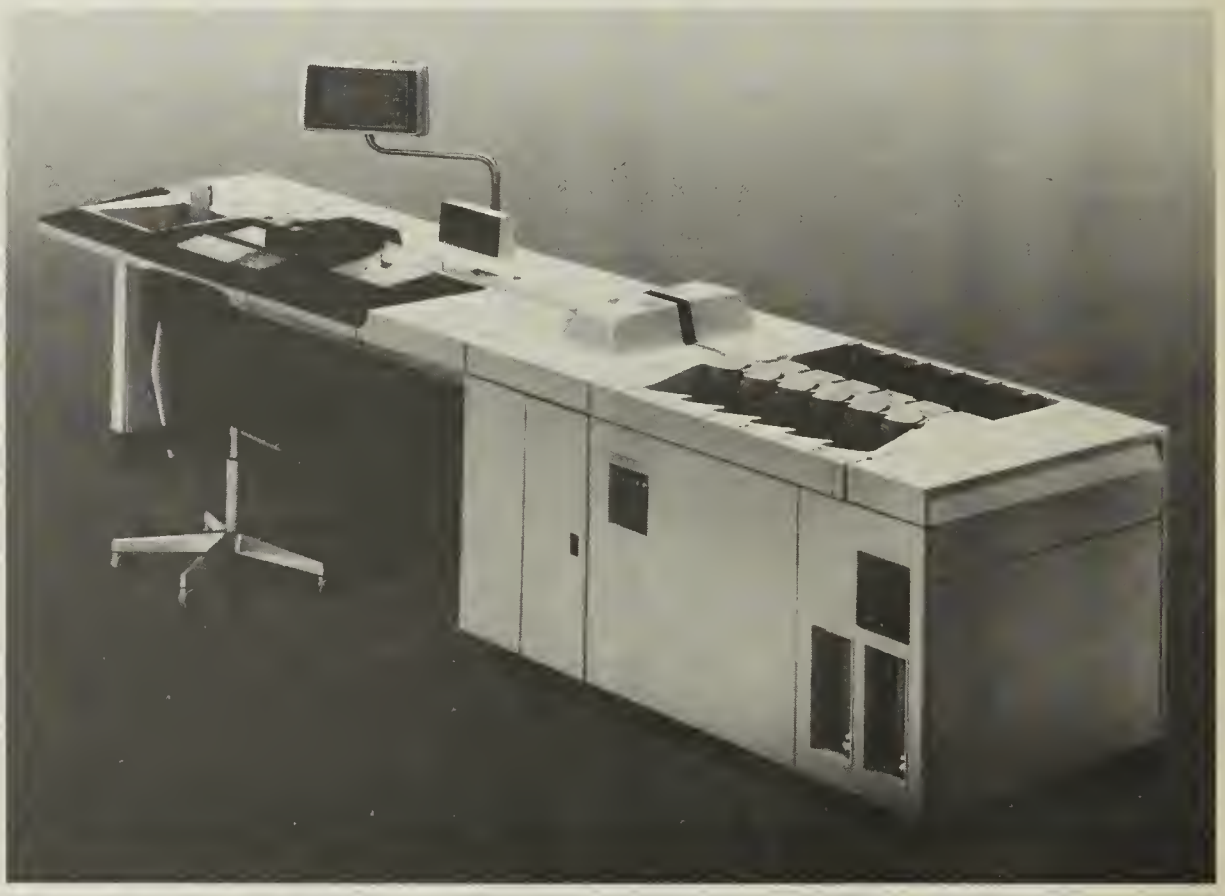

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Then Host a Banquet

Interested in China? 'Get an Invitation'

By Marcia Blumenthal
CW Staff

SAN JOSE, Calif. — "Getting an invitation is the most critical part of doing business in China," Michael Killen, president of Strategic Business Services, concluded after his recent trek to that coveted though still largely uncharted land of opportunity.

Killen's invitation was extended by the Chinese government, which asked him to consult with 50 users and potential users of automated equipment. A report he had previously prepared for the Chiao-Tung University in Shanghai paved the way for his 14-day trip there in February.

The best way for a vendor to expand its horizons in China is to already be doing business there, Killen said. If a vendor has equipment installed, it should request Chinese users to allow a visit to the installation.

The ostensible purpose should be to teach users the most efficient means of using the equipment, Killen suggested.

A seminar on maintenance or some other technical topic is also an effective means of opening doors, he added.

Once in China, the company's representatives should first fulfill their obligations to the Chinese users. While doing this, visitors should also ask their Chinese hosts "for introductions to other departments in the particular ministry that would be interested in using the company's products," Killen stressed. Keep extending the scope of the invitations, Killen urged, emphasizing a company has to be persistent in requesting introductions.

Trade missions are another means of getting invited to China, Killen said. "But you may not want to travel with all your competitors," he pointed out.

In addition to trade missions, private consultants help companies obtain invitations. These consultants, such as the Chase Manhattan Bank consulting group, have contacts with key people in government responsible for evaluating DP equipment, Killen said. Often charging $1,000 a day for services, "many of these consultants have a rinky-dinky room in the Peking Hotel where they do business."

This may seem odd but, with the influx of Western businesspeople, meeting space is at a premium in China, he explained.

However, to get a feel for what is going on in government offices, Killen suggested visi-

(Continued on Page 50)

Makers of Micros Get Invitation

SAN FRANCISCO — The Chinese Electronics Society has asked California Trade Delegations, Inc. to organize a visit of microprocessor and semiconductor manufacturers to the People's Republic of China next month.

Sun Shun-Hsing, secretary of the Chinese Electronics Society, specifically requested that representatives of Fairchild Camera and Instrument Corp., Hewlett-Packard Co., Intel Corp., Motorola Semiconductor Products, Inc., National Semiconductor Corp., Pertec Computer Corp., RCA Corp. and Texas Instruments, Inc. be included in the delegation, G. Douglas Burck, executive director of California Trade Delegations, disclosed.

This is the second trade mission to China that California Trade Delegations has sponsored this spring. The previous group, which visited China in March, was comprised of minicomputer makers [CW, March 26].

During that mission, each company made individual presentations to about 65 representatives of 32 end-user organizations in Peking and Shanghai. These technical seminars averaged about three hours per company, Burck said.

It is expected the second delegation will make similar presentations to the same groups. The delegation will leave San Francisco on May 19 and return June 4.

Adapso Doubts Agency Use Of OMB Rules

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The DP services industry could reap an additional $100 million to $300 million in annual revenues if government agencies followed federal guidelines advocating the procurement of goods and services from private-sector sources, an industry representative estimated.

While this policy has been in effect for several decades, it has never been fully implemented, according to Jerome L. Dreyer, executive vice-president of the Association of Data Processing Service Organizations (Adapso).

Although refurbished guidelines reaffirming the government's private-sector procurement policy will become effective at the end of this month, the Adapso executive was skeptical about whether the guidelines would be enforced. Contained in Office of Management and Budget (OMB) Circular A-76, the guidelines are based on the principle that "the government's business is not to be in business. Where private sources are available, they should be looked to first to provide the commercial and industrial goods and services needed by government."

Exceptions to that policy are made when national security is at stake, when contracting out would be more expensive than performing the activity in-house or when no satisfactory commercial source is available.

"Nowhere do they define what they mean by a satisfactory private source," Dreyer noted.

"Regardless of all the very fine, flowery language [in the circular], it really boils down to [the fact that agencies] can still make the decision to do it in-house. They can go through all the gyrations they want, but they still have great options, very strong options to do it in-house," Dreyer charged.

Adapso is not impressed with the circular's provision that each agency must designate an official at the assistant secretary or equivalent level and officials at subordinate contact points for major components to have overall responsibility for implementation of the circular within the agency."

OMB's definition of DP services eligible for contracting include batch processing and time-sharing; programming and systems analysis, design development and simulation; keypunching and data entry services; systems engineering and installation; and equipment installation, operations and maintenance.

Attorney for Copyright Office Urges Protection of Semi Chips

By Jeffry Beeler
CW West Coast Bureau

SAN JOSE, Calif. — Copyright protection deserves to be extended to the imprinted designs on semiconductor circuit chips, Jon Baumgarten, general counsel for the U.S. Copyright Office, testified last week during a legislative hearing at the Santa Clara County superior courthouse here.

Chip layouts demand "substantial originality, ingenuity, creativity and investment" to develop, and the photographic masks needed to produce those layouts are the tangible by-products of electrical engineering labor, Baumgarten argued.

Thus, chip designs and photographic masks qualify as "original works of authorship" and as such warrant protection against unauthorized duplication, the Copyright Office attorney added.

Baumgarten presented his testimony before members of the U.S. House of Representatives Subcommittee On Courts, Civil Liberties and The Administration of Justice. Chaired by Rep. Robert Kastenmeier, (D-Wisc.), the subcommittee is evaluating H.R. 1007, a proposed amendment to the Copyright Act of 1976.

If enacted, the legislation, co-sponsored by U.S. Rep. Norman Mineta (D-Calif.), would extend the scope of existing U.S. copyright

(Continued on Page 50)

To Meet Industry Problems

Terminal Companies Organize

By Ronald A. Frank
CW Staff

CHICAGO — An industry organization for companies engaged in the buying, leasing, selling and maintaining of data terminals is currently forming.

A group of about 20 terminal distributors held a meeting during the recent Interface '79 conference here to discuss plans for the organization, tentatively named the Association of Data Terminal Distributors.

While most spokesmen at the meeting said the association is being formed to set industry standards and ethical practices, it is believed the group also will be concerned about some "brokers" who reportedly are giving the distributor business a bad reputation.

"Brokers represent about 10% of our business, and some of them do not stand behind their products with service and maintenance the same way that our prospective members do," William Tilley, president of National Computer Communications Corp., said.

These brokers are said to stock little inventory of their own, often requiring the buyer to deal directly with the manufacturer when problems arise. Unlike the terminal distributors, the brokers usually have no sales force.

The association will formulate ethical standards which member distributors are to fol-

(Continued on Page 51)

Not All Chip Makers Favor Copyright Protection

By Jeffry Beeler
CW West Coast Bureau

SAN JOSE, Calif. — Not all semiconductor chip manufacturers favor passage of H.R. 1007, a bill that would forbid unauthorized duplication of large-scale integrated (LSI) circuit designs.

During last week's hearing before U.S. Rep. Robert Kastenmeier's judiciary subcommittee, National Semiconductor Corp.'s Vice-President and General Manager Jon Finch warned that the proposed legislation would boost the price of domestic semiconductor products and aid overseas chip manufacturers at the expense of their U.S. counterparts.

"Copyright laws have no extraterritorial effect," Finch said. "This [bill] would not prevent any foreign company from buying the chip of a U.S. manufacturer, copying it in some foreign country and selling it to the rest of the world.

"Only U.S. manufacturers, who perform the essential masking and diffusion steps in this country, would be hindered by the fear of copyright enforcement actions."

James Early, Fairchild Camera and Semiconductor Corp.'s director of research and development, expressed a similar reaction to H.R. 1007. Even if the Copyright Act of 1976 did cover semiconductor circuit designs, foreign competitors would still duplicate American technology with impunity, Early predicted.

On the other hand, he continued, expanded copyright protection would discourage U.S. chip makers from engaging in reverse engineering, a practice that has long characterized the domestic semiconductor industry and helped spur rapid advances in LSI circuit technology.

Others in Favor

Other semiconductor manufacturers, by contrast, expressed dramatically different views at last week's hearings and urged speedy passage of the copyright law amendments co-sponsored by U.S. Rep. Norman Mineta.

Dr. Andrew Grove, Intel Corp.'s newly elected president, told Kastenmeier and his subcommittee that continued piracy of LSI circuit designs could severely slow the pace of technological development in the domestic semiconductor industry and eventually cost the U.S. its world leadership in that vital field.

What supplier, Grove asked, can afford to invest the massive amounts of time and money needed to develop an innovative product when a less ingenious competitor can produce the same product for a fraction of the original investment simply by pirating and duplicating a design.

Copyright Office Attorney Urges Protection of Chips

(Continued from Page 49)

law to prohibit the illicit reproduction of semiconductor chip designs and photographic masks.

Although Baumgarten voiced support for the intent behind H.R. 1007, he urged the Kastenmeier subcommittee not to enact the legislation without first examining several unresolved issues.

The first of these issues concerns the criteria for judging a design's originality. To qualify for copyright protection, Baumgarten contended, a circuit layout must embody an original approach to an engineering problem for which several other solutions are possible.

If a designer wants to produce a logic function for which only one circuit pattern is possible, the product of his effort cannot qualify as original because another engineer facing the same problem is bound to achieve identical results, much as two individuals who correctly finish the same crossword puzzle will inevitably produce identical solutions.

If H.R. 1007 does not embrace such a notion of originality, it will violate a fundamental principle of existing Copyright law, which extends protection only to the "expression" of an idea, not to the underlying idea itself, Baumgarten explained.

Some of Baumgarten's other comments to the subcommittee included a warning to limit the scope of semiconductor chip copyrights and advice to clarify the definition of some common electronics terms like "integrated circuit chips" and "imprinted design patterns."

'Get an Invitation' Advised As Route to China Business

(Continued from Page 49)

tors be as forceful as possible in scheduling meetings at the host's office.

During his visits to Chinese governments, Killen said, he never saw the usual accoutrements of the Western office — typewriters and secretaries.

Besides using a consulting firm or trade delegation, a company can try to get a list of key players in various ministries, then write letters which forcefully describe the benefit they will derive from the company's visit to the country.

For the best results using this independent tack, Killen suggested stuffing the letters full of sales literature and addressing the envelopes in modified Kanji, the prevalent language of China.

Whatever the means of getting into China, "it is essential that, once there, the company develop a good relationship with the host so he will continue to set up appointments and make contacts for you," Killen stressed.

One way of ensuring a good relationship is by sponsoring a banquet for the host and his staff. At a cost of about $100 per person, these banquets are usually held in hotels or restaurants equipped with special banquet rooms for Westerners.

A gift will also help cement relations with the Chinese host. Technical books or a microprocessor are valued gift selections, Killen said.

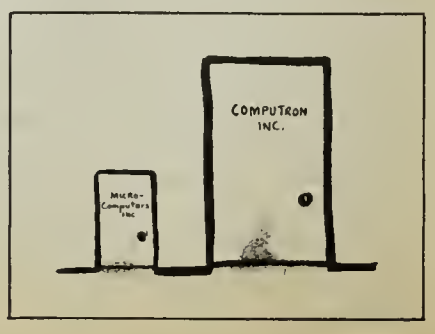
"The Chinese are definitely buying now, not just evaluating equipment," Killen noted.

Although DP equipment is mainly used for scientific purposes, such as oil explorations and economic forecasting requiring "big matrix manipulation applications," the Chinese are very interested in minicomputers both for integration into process control systems and for typical management information applications, Killen said.

However, "it is obvious that no one there knows anything about file structures, transaction processing or systems analyses," he added, predicting that typical management information system (MIS) applications will be a reality in China in the next few years.

While some concern about the ability of the Chinese to pay for equipment has arisen recently, Killen said the DP companies he knows doing business with the Chinese are not worried about getting paid.

Killen is currently putting the finishing touches on a book which describes his experiences in China. The three-volume set features lists of consulting firms, key government officials, including their addresses and telephone numbers, and an analysis of the market for DP equipment in China.



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United Brands Subsidiary Buys Norfield Division

NEW YORK — TRT Data Products, Inc., a new wholly owned subsidiary of United Brands Co., has acquired the assets of Norfield Electronics, Inc.'s Communications Division.

TRT Data Products, which is affiliated with TRT Telecommunications Corp., a private international packet-switching network, was set up to acquire companies making data communications products, a spokesman explained. The Norfield acquisition is the first it has made.

Norfield's Communications Division has been operating for about four years and had revenues of about $1 million last year. The price paid for the division was between $600,000 and $700,000 the spokesman said, adding that TRT Data Products acquired the assets and certain liabilities of the division.

"The acquisition of the Norfield Communications Division through TRT Data Products is a step in the development of the TRT group of companies whose purpose will be to provide a wide range of communications systems, products and services," David H. Lubetzky, TRT's president, said.

Joseph Parisi, a founder and former president of Norfield, has been appointed executive director of TRT Data Products.

Data Terminal Companies Forming Industry Group

(Continued from Page 49)

low to protect customers. In addition, the group will bring before the public issues of importance to its members.

One possible activity may be the presentation of position papers before legislative groups in Washington, but this would be a secondary phase after the association swings into operation.

Advantages Cited

"We feel there are many advantages to customers as well as distributors and manufacturers in having an association," James Loonam of Loonam Associates commented after the meeting. He stressed that the group is being formed to meet industry problems, but added that members do not intend to discuss pricing problems.

Another meeting is planned during the National Computer Conference in New York in June.

Among the firms that attended the Chicago meeting were American Terminal Leasing, Data Access Systems, Carterfone, Cable & Wireless, Tele-Terminals, Ethom Associates, David Jamison Carlyle Corp., Newman Computer Exchange, Terminal Rentals, Consolidated Data Terminals and Computrend.

No Mainframes for the Masses, Cray Says of Long-Term Strategy

MENDOTA HEIGHTS, Minn. — While most hardware makers eye their latest price/performance ratios in much the same way as TV network executives compare viewer share ratings, Cray Research, Inc. has no intention of engaging in that numbers game at present.

Assessing the company's long-term goals recently, Seymour R. Cray, the company's chief executive officer, said he would use the firm's growing resources to develop unique computing equipment, rather than broaden the firm's product line to include smaller, less expensive mass-produced products.

Although Cray thinks the company could compete directly with other large system makers, he prefers to remain in the scientific, problem-solving supercomputer arena in which no other manufacturer offers similar products. The Cray-1 is said to have 20 to 100 times the capacity of other general-purpose computers.

Recognizing this strategy will limit the firm's overall growth rate, Cray said that in the long-term the company would be better off maintaining good profit margins on a small customer base. That base may be fewer than 100 customers worldwide.

Doubled Production Rate

During the past year, Cray's production rate increased to eight machines a year, nearly doubling the production rate a year ago. The backlog of orders for the Cray-1 represents nearly one year's production, Cray estimated.

Cray has achieved this growth with no new capital and minimal bank borrowing. In fact, Cray forecast that the company's financial resources will be sufficient in the next few years to start development of the Cray-2.

This system is expected to have a four to six performance factor over the current product. Cray offered no projections on the delivery dates for that product.

An enhancement to the Cray-1 will be announced this year, however, according to John A. Rollwagen, president.

During 1978, the firm broadened its marketing horizons, particularly in the commercial and international marketplaces, Rollwagen noted. Cray opened two domestic offices to serve specialized commercial markets and formed its first foreign subsidiary, Cray Research (UK) Ltd.

For its latest fiscal year, ended Dec. 31, Cray reported revenues of $17.1 million, up from $11.3 million in the previous year. Earnings totaled $3.5 million or 87 cents per share compared with earnings of slightly more than $2 million or 56 cents a share for fiscal 1977.

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Contracts

Aydin Controls has been awarded a $3.5 million contract from TRW, Inc. According to the contract, Aydin will deliver 45 color graphics display consoles for use in the joint Army/Air Force/Navy Battlefield Evaluation and Tactical Analysis system.

CII Honeywell Bull, Honeywell, Inc.'s French affiliate, has received a contract from the French postal, telephone and telegraph (PTT) authority for the implementation of a national center for the switching of interbank messages. The contract, valued at approximately $4.7 million, is for six Level 6 minicomputers as well as the development of switching software.

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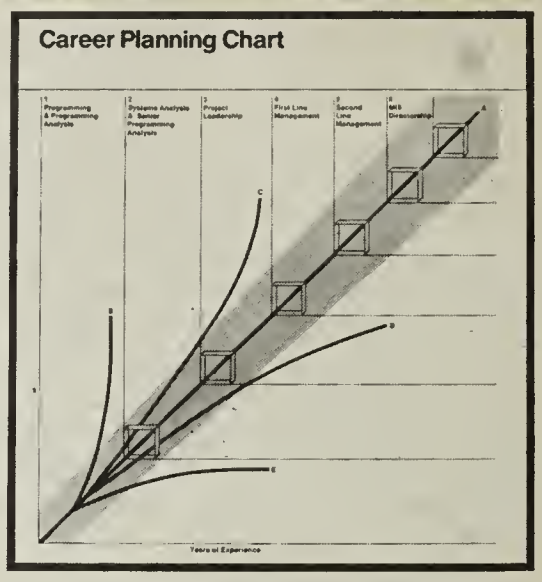

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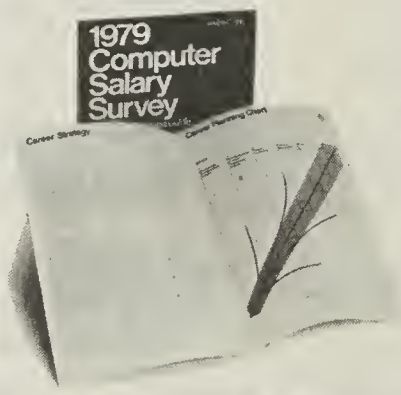

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Whether you're looking for an improved Data Processing opportunity-or for just the "right" person to fill a position - our specialized Data Processing Service can come to your rescue. With affiliated offices, our contacts are vast and varied. Try us . . . you'll like us!

Send your resume or job requirements in complete confidence to:

Tony Menconi, EDP Specialist
INFONAMICS, INC.
Suite 228
15 Spinning Wheel Rd.
Hinsdale, Ill 60521
or call (312) 325-7660
or wire TLX 20-6285

HONEYWELL L - 66/80

On the spot offers for junior (1-2 yrs) and intermediate (2+) programmers with H-6000 or HIS Level/66 applications programmers with COBOL, GMAP or FORTRAN Exp. Progressive non defense systems group expanding it's suburban Northern Virginia office. Help a major user develop his State of The Art Interactive Honeywell Data base System. Advance into TP or Data Base Management Systems. GCOS, IDS or TDS/TPE helpful. Some Senior leve' reqs. exist. Salary Range from $15,000 to Mid Twentys. Brand new facility, free parking, health, dental, retirement any other benefits. We are really moving — are you ready to move? If so call us @ 703/356-1997 and evening till 9 PM or write: Computer Science Div. CYBERMETRICS CORP. PO Box 579, Mclean VA 22101 E.E.O/ M/F

Data Processing Professionals... Match Your Professional Goals With Ours

Unique opportunity to rebuild the Corporate Data Processing department of a $70M company. We are a growing, dynamic manufacturing and distribution team with immediate needs. Conveniently located in a suburb of Los Angeles.

We are expanding our hardware, software and facility. The current on-line order-entry/inventory systems has a nationwide network linked to a Univac 90/30, with additional 90/40 due July 1. If you are interested in a company that appreciates and is involved with its data processing resources, consider joining us in the following areas:

Systems Analyst

Heavy emphasis manufacturing and distribution systems with in-depth exposure to DP. BA or equivalent.

Programmer/Analysts

2-5 years experience. BA or equivalent. Financial, manufacturing, distribution or marketing applications.

If your professional credentials and personal ambitions match one of these career opportunities, we invite you to call:

Chris Brooks
Employment Supervisor

GSR®
R&G Sloane Manufacturing Co., Inc.
P.O. Box 876
Sun Valley, CA 91352
213/767-4726

Equal Opportunity Employer M/F

CALL (toll free) 800 621-2184
Illinois residents call (312) 977-1555

It is no longer necessary for you to cope with speculative statistics to evaluate your salary status. One of America's most prestigious research firms has made available to each of our NCA offices a professional survey that authenticates data processing salaries in the Metropolitan Areas of: Boston, Chicago, Columbus, Dallas, Denver, Detroit, Hartford, Kansas City, Los Angeles, Miami, Milwaukee, Minneapolis/St. Paul, Newark, New York, Philadelphia, San Francisco, Seattle, Washington, D.C., The Carolinas, and Upstate New York.

To get the survey for any of the aforementioned areas, call 800-621-2184, toll free, Illinois residents call (312) 977-1555. Each office has a large copy of the complete national survey that you can examine by visiting the office nearest to you.

National Computer Associates
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PROGRAMMER/ ANALYST

RMS, a Citicorp Retail Merchant Services Company, is seeking an individual with 3-4 years COBOL, CICS, DOS/VS experience. We offer a competitive salary and benefit package. Please send your resume and salary history to;

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ATTN: Systems
P.O. Box 1558
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Responsible for planning and directing tha activities of tha Operating Systems Programming Group of 6 people. Primary responsibility for large scale batch and interactive operating systems (CDC 6400 and DEC 20) activities. Tha group is responsible for consulting on real time and data collection applications. BS Degree in a relatad field plus two years' experience in operations programming and one to two years' of supervisory experienca and a working knowledge of higher lavel and assembly language programming.

Pleasa send your resuma, including salary requirements, to: **M.J. Martinez, Personnel Office, LEHIGH UNIVERSITY, Johnson Hall 36, Bethlehem, Pa. 18015.** Equal Opportunity Employer M/F

EDP SYSTEMS CONSULTANTS

The management consulting group of our Big 8 public accounting firm is offering talented EDP Systems Consultants the opportunity to apply their expertise in a dynamic environment with a wide variety of clients, industry exposure, and projects.

To qualify for these positions you must have a minimum of 2 years EDP Systems experience in 1 or more of the following areas:

- Manufacturing
- Public utilities — electrical or gas
- Petrochemical industry
- General Systems including accounting applications

A college degree is required, an advanced degree is a definite plus.

Our starting salaries and employee benefits package, are highly competitive and our performance bonus plan generous.

For immediate consideration, please call our 24 hour toll free number:

1-800-821-7700 Ext. 605
Missouri residents call: 1-800-892-7655 Ext. 605

Or send resume in complete confidence to:

Deloitte Haskins+Sells

Robert A. Wolf
Personnel Director
1200 Travis
Houston, Texas 77002

An Equal Opportunity Employer M/F

ASSOCIATE SYSTEMS ANALYST

SUN PIPE LINE COMPANY, a subsidiary of Sun Company, Inc., a major Fortune 50 Corporation, presently has an immediate opening for a skilled and knowledgeable Systems Analyst for our pleasant suburban Philadelphia location.

This specialist position will involve you in the design, development, implementation, documentation and maintenance of assigned system modules for both realtime and offline data processing systems. You will also be responsible for assembling and analyzing data-based requirements of system operation, and determining optimal system design based on available hardware and software.

In addition, you will apply your expertise to converting design into segmented logic and translating into specific code for existing hardware. You'll also be required to develop final documentation for system maintenance. Must be available for call-outs to minimize system downtime, and may be assigned to other than day shift.

To qualify you should have a college degree in math, accounting, or computer science, or demonstrate equivalent experience. Prior knowledge of FORTRAN, assembly language, and systems analysis preferred. Salary range up to $20,000, depending upon experience. Our company also offers a full range of benefits and excellent advancement opportunities.

Interested applicants should send resume, including current salary, in confidence, to:

SUN PIPE LINE COMPANY
EP-1, P.O. Box 2059
Philadelphia, Pa. 19103

Equal Opportunity Employer
M/F/H/V

PACIFIC NORTHWEST REGION

Partial list of current job openings:

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EDP Auditors . To $25K
Systems Analysts To $24K
Programmers . To $22K

Alaska
Prog/Manager . To $35K
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CSC

PROGRAMMER/ANALYSTS

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If you have a Bachelor's or advanced degree in Computer Science, Mathematics, Physics, Astronomy, or Engineering, and a background in large-scale or mini-computers, you'll agree this is the ideal way to find out how you can advance your career.

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OR send your resume to:

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Staffing Department C-117
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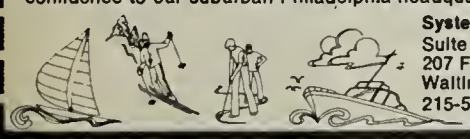

Systems Personnel, Inc.
Suite D-26
207 Fox Lane
Wallingford, PA 19088
215-565-2920

Systems Personnel inc.
A NATIONWIDE CAREER SERVICE

CITY OF JACKSON, MICHIGAN
is seeking
DATA PROCESSING DIRECTOR

Opportunity for aggressive individual with successful background and experience supervising all phases of data processing. Present environment is IBM 370/OS, ANS COBOL, RPG, and distributed data entry. We are a remote site to another agency's mainframe; have just implemented financial systems and are ready for GBF/DIME, on-line retrieval and project cost accounting. Salary range of $23,372 to $29,252. An Equal Opportunity Employer. Applications taken through April 27, 1979.

Send resume to:
City of Jackson, Michigan
Personnel and Labor Relations Department
161 West Michigan Ave.
Jackson, Mich. 49201

PROGRAMMER/ANALYSTS

Informatics, the largest independent supplier of commercial software services, is seeking job oriented individuals who will become part of our professional staff of Data Processing Consultants.

Challenging opportunities are available now in our San Francisco, Los Angeles, Dallas and Seattle offices for professional Programmer/Analysts with at least 1 year of experience in one or more of the following areas:

Languages	Software	Hardware
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If you are a bright individual who enjoys client contact we want to hear from you. We offer diversified career development, paid overtime and a comprehensive benefits package. Please send your resume in confidence to:

Joe Tirado
c/o Informatics/PMWD
Spear Street Tower
1 Market Plaza, Suite 1018
San Francisco, Ca. 94105

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equal opportunity employer m/f/h

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Some responsibilities include monitoring data being placed on lexicon data dictionary by applications personnel; provide technical assistance; coordinate the implementation of programs which interface with, or supplement the lexicon software. Qualifications are experience in the use of lexicon data dictionary software and its input processing and report writing facilities; programming in COBOL; Job Control Language; and a basic understanding of system design techniques. Succesful candidate must also have excellent written and verbal communication skills.

Software Programmer

This individual will be responsible for the generation and maintenance of the company's operating system software. The successful candidate must have 2+ years' experience in an SVS or MVS environment using IBM utilities, JCL, SMP and ASSEMBLER programming language. Ideal background includes experience in the use of TCAM, VSAM, HASP and/or RJE systems.

We offer an excellent salary and benefit package with opportunity for growth and development. Please send resume and salary history to:

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PROFESSIONAL EMPLOYMENT REPRESENTATIVE
SOUTHERN CALIFORNIA GAS COMPANY
Section 108
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Terminal Annex
Los Angeles, California 90051
Equal Opportunity Employer

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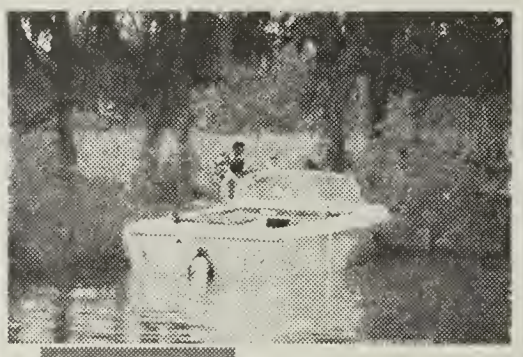

Clear Lake, that is. If you'd rather be sailing, fishing, boating, or skiing, then you should be working for Ford Aerospace and Communications Corporation. We're located in the Clear Lake area, situated by Galveston Bay, just 25 miles from the Gulf of Mexico, known for excellent deep sea fishing. Around the lake there are numerous marinas and yacht basins that distinguish the area as the boating mecca of the Gulf Coast. And we're a comfortable distance from the big city—just 30 minutes from downtown Houston.

Our career opportunites are equally attractive. As a leader in custom data processing systems for large-scale ground-based communications, command and control applications, we have immediate openings from entry level to senior level in the following areas:

SYSTEMS PROGRAMMING: Requires OS internals experience on micro, mini, or large scale computer systems. Design and implementation of I/O drivers, systems enhancement and system utilities is a plus.

APPLICATION PROGRAMMING: Will be required to design, code, verify, and document assembly language or Fortran programs for a real time system. Telecommunication and/or process control experience is a definite asset.

APPLICATION PROGRAMMING: Analysis in programming experience on aircraft and digital avionics systems. Assembly language programming on mini-computers desirable.

We can offer highly competitive salaries and an outstanding benefits package, as well as excellent opportunities for advancement. What's more, Texas doesn't have a state income tax. So if you're looking for a career opportunity that won't interfere with your fishing, or if you want to get away from the big city for more than just a weekend, the answer is clear...Ford Aerospace & Communications Corporation. For more information CALL COLLECT or send a resume to Mr. John Brown, Space Informations Systems Operation, P.O. Box 58487, Houston, Texas, 77058, (713) 488-1270.

Ford

Ford Aerospace & Communications Corporation

We are an equal opportunity employer, m/f.

Data Communications Writers

Our Corporate Headquarters' Technical Publications Department has several positions for qualified writers experienced in data communications documentation. Projects include researching, organizing, and writing communications-related users' manuals, systems analysts' manuals, and data sheets for Wang's Word Processor Systems, Office Information Systems, and Computer Systems.

Candidates should have two or more years technical writing experience with concentration in one or more of the following areas: BSC protocols (including 2780, 3780, 3741, or 3270), SDLC, or SNA. Bachelor's degree required; advanced degree a plus.

These positions offer career opportunities at Wang. We emphasize high quality documentation and provide an excellent working environment with complete hardware/software accessibility. Salary with benefits are competitive. Please submit your resume, including salary requirements, to Linda G. O'Connor, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851.

Computers

WANG

Word Processing

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EDP

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COBOL PROGRAMMERS - In Insurance, Banking or Manufacturing. Openings in IBM OS/DOS or Burroughs shops. Degree/Data Base a bonus. Openings to 20K

PROGRAMMER ANALYSTS - Key positions in Banking & Manufacturing. IBM & Burroughs shops with on-line applications using various Data Base packages. COBOL. Degree/RPG II a plus. Openings to 24K.

SYSTEMS PROGRAMMERS - IBM OS or DOS Sysgens, COBOL, Assembler & Software Support. To 25K.

Clients will pay ALL cost. Mail confidential resume to Rex Bailey.

Excel Personnel
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Greenville, S.C. 29607
Phone: (803) 233-2546

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Immediate openings in our expanding Information Systems Department for Programmer Analysts with two to three years experience in financial and/or manufacturing applications using COBOL. Excellent salary and benefits including liberal education assistance.

E-SYSTEMS
ECI Division

An equal opportunity M/F employer

Send your resume to:
William C. Peterson
Personnel Manager
E-SYSTEMS, INC.
ECI Division
P.O. Box 12248
St. Petersburg, FL 33733

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E.D.P. OPPORTUNITIES

Scientific/Commercial

Ayerst Laboratories, a major ethical pharmaceutical company, has four excellent career opportunities in an expanding E.D.P. environment.

Manager of Scientific Programming

Will manage a multiple installation mini-computer operation for laboratory automation. Must have a solid background in mini-computer system design and project managment. Degree required, preferably in Computer Science or Science; advanced degree a plus. At least six years experience, three in minis, is required.

Senior Scientific Programmer

Will be responsible for the analysis, design, and implementation of programs for laboratory automation on an IBM Series 1 mini under EDX. Must have a strong background in data processing for scientific applications, primarily in data acquisition and retention. Degree in Science or Computer Science required; advanced degree a plus. IBM Series 1 exposure would be a strong advantage. Should have supervisory experience over small groups of professionals. At least four years experience required, preferably in minis.

Junior Scientific Programmer

Will write programs and perform operational tasks under the direction of the Senior Scientific Programmer. Should be a college graduate with some computer science exposure. The individual will be given progressively greater responsibility in the area of scientific computing as our environment expands to meet future needs.

Systems Programmer

Experienced on IBM 370 with DOS or VS 1/2. A solid knowledge of VSAM, CICS and data management is necessary. This individual will be responsible for system software on our system 370 mainframe, and will assist in converting from a Honeywell to an IBM environment. At least three years solid experience is required.

Our facility is located in the scenic Adirondack Mountain-Lake Champlain region of New York State, a friendly, lower cost of living area within a short drive to Montreal, the Lake Placid Winter Olympic site and Vermont ski centers.

We offer a competitive starting salary with a full line of benefits, including dental and prescription plans and fully paid relocation and interview expenses.

Resumes must include salary history or requirements. Send to:

Ayerst

Mr. Kerry McDonnell
Assistant Personnel Manager
Ayerst Laboratories
Rouses Point, New York 12979
An equal opportunity employer, M/F

DATA PROCESSING OPPORTUNITIES

COMTEN, INC., the leading independent supplier of sophisticated data communications equipment has several openings for talented data processing professionals.

Our great success in the data communications marketplace, 43% annual growth, has enabled us to expand our staff in several areas throughout the U.S

- **MANAGER OF MEASUREMENT PRODUCTS**

Responsibilities include managing our product line of data processing and data communications instrumentation, developing marketing policy, coordinating customer development guidelines, and coordinating the release of products to our sales department. Qualified candidates should possess experience with instrumentation used in data processing and/or data communications with emphasis on marketing. This position operates out of St. Paul, Minn. headquarters.

- **MARKETING REPRESENTATIVES**

Responsibilities include marketing COMTEN systems, managing current COMTEN accounts and establishing new accounts. Qualified candidates should have 2-5 years data processing sales experience and be able to work well independently.

- **MARKETING SUPPORT ANALYSTS**

Responsibilities include presenting COMTEN products to customers/prospects, managing COMTEN products implementations, and training other COMTEN personnel on COMTEN's constantly changing product line. We're looking for someone with marketing support experience, preferably with a large computer vendor, and an exposure to product management.

- **BRANCH MANAGERS**

Responsibilities include account management, budget control, prospecting, and staff management. Qualified candidates should possess at least 3 years of successful sales or sales management experience, preferably in a data processing environment.

- **PROJECT MANAGERS**

Responsibilities include providing long term planning assistance to large COMTEN users as well as planning and monitoring major COMTEN systems installations. Qualified candidates should have prior management experience, preferably in an IBM teleprocessing environment. COMTEN hardware/software product knowledge is a plus.

- **SYSTEMS ANALYSTS**

Responsibilities include systems implementation, installation planning, and customer support. We seek individuals with a good ASSEMBLER language background and an exposure to telecommunications. IBM and/or COMTEN knowledge is a definite plus.

If you're an aggressive individual looking for unlimited opportunity, we invite you to explore the possibilities of a career at COMTEN!

We offer excellent compensation, complete benefits, and an excellent opportunity for personal advancement. For immediate consideration, please call COMTEN's Personnel Office COLLECT at (612) 633-8130 or send a resume with geographic preference in strict confidence to.

Chuck Wilson
COMTEN INC.
1950 W. County Road B-2
Roseville, MN 55113

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COMTEN

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Thought to be extinct: Lurking in Ancient, Musty, Dead-End Jobs; Watching the world pass them by. Come out of your caves and explore the evolutionary and challenging new opportunities available at Cutler-Williams.

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We offer the technical opportunity to work in a variety of State-Of-The-Art Data Processing environments that range from IBM mainframes to PDP minis.

We have requirements for:

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- PROGRAMER/ANALYSTS

CUTLER-WILLIAMS provides major league benefits which include paid medical, dental and life insurance coverage. The company is committed to increasing the DP education level of our employees on a continuing basis, both by practical "hands-on" experience and through our Corporate Education System.

So, if you are trapped in a Data Processing cave, check into the current opportunities at Cutler-Williams.

Please call or send resume to:

CUTLER-WILLIAMS, INCORPORATED
Director of Recruiting
2655 Villa Creek Dr., Suite 205
Dallas, Texas 75234

TOLL FREE 1-800-527-4907
(in Texas, call 214-243-3421)

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SYSTEMS PROJECTS MANAGER

Int'l Banking Applications

First Chicago is developing international banking applications on TANDEM minicomputers. It is an ambitious program which includes the definition of the business systems design, computer systems design, implementation and user liaison. Using a decentralized development strategy, the professional team based in our Chicago facility will be responsible for several systems applications which include communications and networking.

The Projects Manager will be an experienced, results-oriented professional. Qualified applicants will have programming experience using COBOL, PL/1, Assembler and/or ALGOL and have a good understanding of data base concepts. This demanding position offers an outstanding opportunity for an individual with prior experience in project leadership and control to expand his/her international banking/financial career and knowledge of communications systems. Some travel will be required.

We offer a generous salary and a superb collection of benefits. Interested candidates are invited to respond with detailed resume, including salary history, in strictest confidence, to:

David E. Fyhrie

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Chicago, IL 60670
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SR. AUDITOR, EDP
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For further information, please contact Data Processing Specialists Ron Timm or Tom Fischer in our Downtown office at

(713) 658-9898

or Roger Hall or Mul Webster in our Greenway Plaza office at

(713) 621-9050.

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Please send resume to:

S. Guyer
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7995 E. Prentice Ave.
Englewood, CO 80111

united cable television corporation

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(415) 941-3200

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Encino, (LA) California 91436
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(Search Reopened)

The University is seeking an assistant director for operations to manage the computer operations, data entry and production control components of the administrative data processing department.

Applicant must have at least 5 years of data processing experience with medium to large scale IBM systems, operating under VM and DOS/VS and must have at least three years of high level management experience in all aspects of production oriented computer operations. It is essential that applicants have excellent communicating skills, technical competency in DBMS and/or online environments and demonstrated management skills. Exposure to higher education applications is desirable. Applicants with bachelor's degree in computer related disciplines are preferred. Total compensation is competitive as we offer excellent benefits package and salary in high teens.

If you feel you are qualified, please send resume and names of 3 professionally related references, by May 25, to: University of Vermont, Box 57R, Burlington, Vermont 05405.

An Affirmative Action Employer

EDP MANAGER

Small expanding hospital facility. Requires technical manager. COBOL REQUIRED. Ability to relate to users and plan a must. Excellent opportunity in a pleasant environment.

Mr. S.G. Nazzaro
Wheeling Hospital
Medical Park
Wheeling, West Va., 26003
(304) 243-3263

BY-THE-SEA

The University of North Carolina is accepting applications for the position of Academic Services Programmer/Analyst. Applicant must have a bachelor's degree and should have several years experience working in a university computing center environment. **Send resume to Personnel Office, UNC-Wilmington, P.O. Box 3725, Wilmington, N.C. 28403. Deadline for accepting applications is May 4, 1979 and May 7, 1979.**

An Equal Opportunity Employer

INFORMATION SYSTEMS ANALYST

Search reopened

Responsible for developing an integrated university-wide student system. Candidates must have the ability to communicate with a diverse group of administrative users and be able to specify system requirements to the administrative computing department. Minimum requirements include a bachelor's degree and experience in systems analysis and design. Send resume and salary requirements to: **Dr. Frank Birtel, Provost, Tulane University, New Orleans, Louisiana 70118,** before **May 5, 1979.** Affirmative Action/Equal Opportunity Employer.

PROMOTE YOURSELF

SUNBELT OPPORTUNITIES
(Florida to Texas to California)

IBM Software Support Specialists: (Houston, Dallas, San Francisco, Los Angeles, Miami, Atlanta, Pacific Northwest) Samples of positions are:

370/VM Internal Specialists	$31,000
MVS/JES 2 or 3 Analyst	29,500
IMS/VS Internals Programmer	27,000
OS/VS 1 and VS2 Internals Programmer	26,000
Telecommunications Specialists	27,900
OS Performance Analysts	34,000
370/DOS/VS, Power/VS Analysts	25,000

Nuclear Power Plant Data Base (Texas)
Manager (Major power plant seeking an aggressive professional to head up a new Data Base Group)
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Expanding state of the art installation, with 90% new development and a staff of professionals, seeks an above average individual with experience in CICS and DL/I to be responsible for data administration and technical support. All necessary education will be provided for the individual with strong motivation and high learning ability.

This challenging position offers a unique opportunity for growth in a professional environment, in addition to competitive salary and fringe benefits.

Candidates interested in developing their abilities in a dynamic position should send resumes and replies to:

Director of Human Resources,
KNAUF FIBER GLASS
240 Elizabeth Street
Shelbyville, IN 46176

KNAUF FIBER GLASS

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SOFTWARE ENGINEERS

Leading New York Publisher

requires Software support people with 2-3 years experience in Real Time Assembly Language Programming.

Excellent opportunity for the right people to become involved on all software aspects of the world's largest Text Processing/-Phototypesetting System.

Each individual will assume direct responsibility for monitoring the design and directing the implementation of one facet of the total system.

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Send resume including salary history
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PROGRAMMER ANALYST

Walt Disney Productions, located in Burbank, has a unique career opportunity for a Programmer Analyst to work in a dynamic interactive environment with a wide range of business applications. Responsibilities of this position involve developing flow or structure charts of programs obtained from users general specifications, coding, testing and debugging the program-documenting the results.

Successful candidate will have 3-5 years of COBOL programming experience with large scale computer applications. Also requires experience in analyzing and designing systems. BAL programming experience desirable.

To apply, submit resume and salary history to:

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Armed with your technical expertise and knowledge of system operation and data structures, you would provide complete software support to our customers.

You would isolate and fix software problems in both user written and system software. You would perform complex software installations as well as provide technical support for the writing of custom system services and 10 device handlers. JKS position requires a self-motivating professional with 2 to 5 years of related experience. A BS degree in Computer Science, Engineering, Chemistry, or Physics, as well as a working knowledge of assembly language and Fortran in the real time super mini environment.

We offer highly competitive salaries, substantial fringe benefits, challenge and the opportunity for career growth and advancement. If you are interested in finding out more about this exciting career opening with MODCOMP, please send a resume with salary history to or call collect:

Mr. Gene Huffman
MODCOMP
188 Industrial Drive, Suite 314
Elmhurst, Illinois 60126
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System software development at ADR is not system programming. You won't apply endless PTFs, move data sets around, write exit routines or the sixteenth version of the charge-back report.

If you are tired of being a caretaker and want the challenge of being a software developer, we want to talk to you.

ADR is the #1 software products company in the world. We are large enough to be stable and respected, small enough to be informal—with room for personal recognition and professional advancement. Our attractive Princeton, N.J., location offers a quiet rural environment within easy reach of both New York City and Philadelphia.

We are currently embarking on several new projects to develop the software systems of the 1980s. The result is an immediate need for a variety of talented data processing professionals from support specialists to senior system analysts. Call us collect in Princeton at 609/921-8550 if you have experience in any of the following areas:

- **Assembly language and OS**
  Work on ROSCOE, our online program development system for OS. Work is in progress or planned in 1) secure operating environments; 2) problem-solving, interactive languages; 3) enhanced man/machine interface; 4) distributed processing. Requires several years of Assembly language experience. Call Alan Polk.
- **DOS/VS software development**
  Assist in the design and implementation of performance measurement tools for DOS/VS. Requires Assembly language and knowledge of DOS/VS internals. Familiarity with performance measurement helpful. Minimum two year's experience and/or college degree preferred. Call Philip J. Berg.
- **Online systems and display terminals**
  Assist in the design and implementation of an online program development/generation system. Requires familiarity with commercial applications, data base concepts and language processors (compilers, interpreters, and query languages). Programming experience with display terminals and/or a CS degree preferred. Call Adam Rin.
- **Assembly language, MVS and VSAM**
  Assist in the design and implementation of a source management system for online and batch access. Requires several years of Assembly language experience and familiarity with VSAM and MVS internals. Knowledge of data base concepts and/or a CS degree preferred. Call Ralph V. J. Lanni.

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We are also looking for talented people to fill a variety of support and documentation positions. Please call Ed Smith, Personnel Director, for more information on any of these openings.

Technical Support Specialists to work on:

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  Train new customers in the use of our generalized pre-compiler for COBOL applications development and maintenance. Provide telephone and on-site technical support. Requires experience with COBOL programming and commercial business applications. Experience with structured programming methods, data base applications and Assembly language preferred. Good communication skills essential. Traveling required.
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  Aid customers and ADR field representatives in the use of our performance measurement product line. Good communication skills essential. Some familiarity with OS and/or DOS internals highly desirable. Light travel.

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Present the MetaCOBOL Product Group to new prospects. Requires COBOL programming and commercial applications experience. Good communication skills essential. Traveling required.

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We have openings at all levels for writers and editors to research and write both internal and end-user documentation. Requires English or Journalism degree and/or previous technical writing or data processing experience. COBOL programming experience preferred.

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Director, Software Products Division

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Mr. J.J. Aguilar
Dept. GJK
Washington Public Power Supply System
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☐ Computer System Designers.
Minimum 1½ years structured COBOL and IMS programming experience in an IBM OS/VS envirenment using TSO. Skill in developing program specs, testing, coding, documenting, etc. College degree or equivalent experience preferred.

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Address_____

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Positions offer great opportunity to work in a sophisticated computer environment and to become involved in every facet of the company's operations. Salary range is open and will be commensurate with individual's experience.

Send resume along with salary history to **GORY ASSOCIATED INDUSTRIES, 1773 N.E. 205th Street, N. Miami Beach, Fla. - 33197 ATTN: John Thomas, Personnel Director.**

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Two to three years of Cobol programming experience in Marketing, Manufacturing or Financial areas. Experience with Level 66 hardware a must with TDS or TP on-line exposure highly desirable.

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Experienced in providing vendor software support, hardware/software problem analysis, and establishing technical requirements. Must be experienced in Honeywell communications software.

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Personnel Specialist
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Modular Computer Systems, Inc. (MODCOMP) is seeking creative, hard-working, and enthusiastic professionals to join our Software Development Division in the following positions:

REAL-TIME I/O SPECIALISTS

Qualified individuals must have prior experience in applying operating systems to real-time environments. In this position you will be responsible for I/O process control applications. Previous experience is essential in the development of process control languages, real-time operating systems, and/or data acquisition and control software. BSCS or EE is preferred

SENIOR SYSTEM PROCESSOR SPECIALIST

Our systems processors group, is seeking individuals with a minimum three years experience in the design, testing, and documentation of system processors. Emphasis will be placed on previous compiler experience - especially COBOL and/or PASCAL. BSCS or equivalent preferred.

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Opportunities exist to design and implement real-time, multi-tasking operating systems components. Individuals must have a minimum three years experience in operating systems software, including a detailed knowledge of computer architectures and familiarity with modern operating system design theory. BSCS or equivalent is preferred.

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As a Diagnostic Programmer, you will be responsible for developing stand-alone and on-line diagnostic packages. Functions include conceptual definition, project design, debugging and implementation. BSCS or equivalent is preferred.

These openings represent an excellent opportunity to join a growing leader in the computer industry. MODCOMP offers highly competitive salaries, career growth, and fringe benefits including a stock purchase plan, dental insurance, and relocation expenses. Besides, where else can you find beautiful beaches a few miles away, unlimited tennis courts, and golf courses in your backyard?

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Dick Green
MODULAR COMPUTER SYSTEMS, INC.
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Send your resume in complete confidence to Rod Manning

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R.H. Cressman, Jr.
CORDIS CORPORATION
International Headquarters
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This is a special opportunity to join an expanding company where a professional can make an immediate impact and enjoy a highly competitive salary, unusually liberal benefits, and continuous opportunities for career growth. Please submit resume and salary history in confidence to Tony Walker, Personnel Manager.

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Send resume and three letters of reference no later than May 15, 1979, to Dr. Donald Klett, Sangamon State University, Springfield, Illinois 62708. ***An affirmative action/equal opportunity employer.***

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Experienced in designing signal processing functions with CMOS, TTL, ECL families, development of detail circuit designs from conceptual block diagram requirements. Particular applications to PSK, QPSK, Satellite Modems, TDMA, Direct Spread Spectrum, Frequency Hop Spread Spectrum Modulation Techniques. (MSEE preferred)

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Detail design background primarily with digital systems. Must be capable of contributing to IR&D and proposal activities, perform conceptual design, analysis and costing on digital communication systems. A background in microprocessor based systems, busing technology and firmware/software development is desirable.

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Requires experience in analysis and design of RF systems and subsystems. Detailed knowledge of transmitter and receiver subsystems, analog signal processing and adaptive antenna techniques. (BSEE or MSEE)

SYSTEMS ENGINEERS

Requires the ability to analyze and determine customer requirements and lead development efforts for large communications systems. Requires familiarity with C3I, WWMCCS, satellite and terrestrial communication, spread spectrum techniques and communication protocols. (MSEE or PhD)

Send resume with salary history to: Raeburn Josey, Professional Staffing, Harris Corporation, Government Communication Systems Division, PO Box 37, Melbourne, Florida 32901.

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an affirm. act./equal oppty. emp.

CSC

PROGRAMMERS/ SYSTEMS ANALYSTS

The System Sciences Division of Computer Sciences Corporation, a leader in information sciences, is currently involved in many exciting projects. Find out the contributions you can make as a member of our team. We have openings in support of our FAA Air Traffic Control Simulation Support and Real-Time Programs in the Atlantic City, New Jersey area. We're seeking individuals with at least a Bachelor's degree in a hard science and 2 years work experience. You will be involved in the development of air traffic control simulation software and the evaluation of advanced air traffic control concepts. Experience in any of the following areas is desired:

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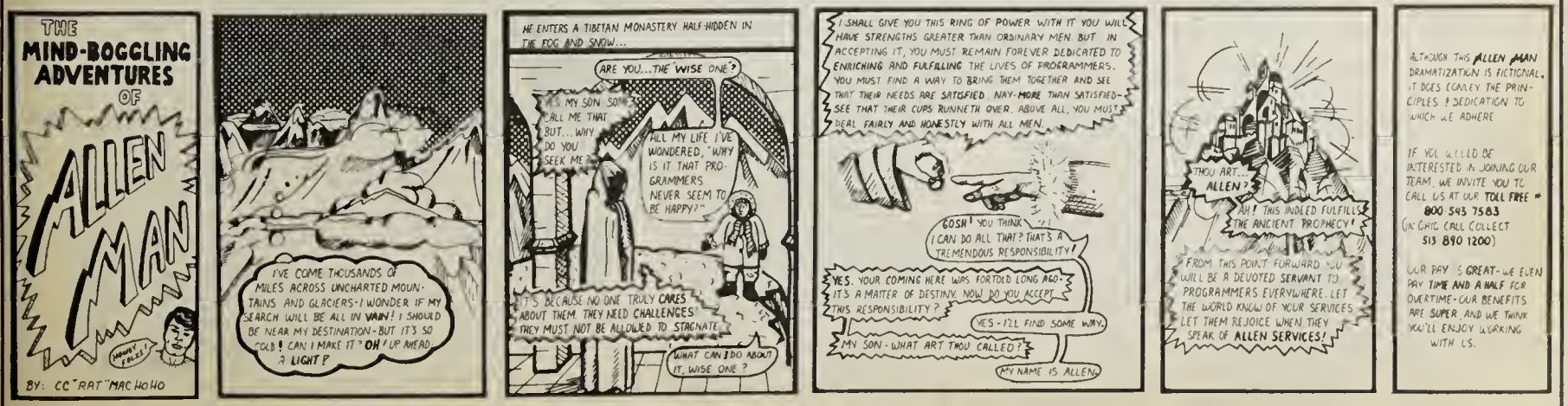

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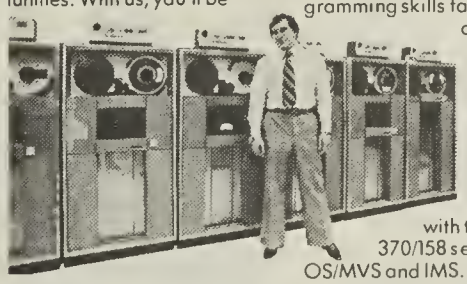

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PROJECT LEADERSHIP RESPONSIBILITY

Upper Peninsula

Cleveland-Cliffs is a major iron ore mining and processing Company with extensive interests in energy minerals, Great Lakes Shipping and other natural resources. We are offering an excellent opportunity for a growth oriented Programmer Analyst in our Michigan Mining Division Information Systems Department.

The ideal candidate will have 5 to 7 years in design and programming of business systems in an OS/VS1, IMS, IBM 370 Series Installation. The individual should enjoy a challenging yet informal work climate; an appropriate college degree is considered desirable.

Our Northern Michigan location of Ishpeming offers the advantages of a small town environment and the opportunity to enjoy many outdoor activities in beautiful surroundings. Marquette, 20 minutes away, provides a variety of shopping, cultural and educational facilities.

We also offer an excellent salary plus year end bonus. Our non cash compensation program is Company paid and comprehensive, and includes immediate fully paid family hospital and medical, dental coverage, Life insurance and 3 weeks paid vacation after the first year.

For prompt and confidential consideration, please send resume, including salary history, or CALL COLLECT

MR. H. R. FIEBIG
The Cleveland-Cliffs Iron Company
C/o Industrial Relations Dept.
1460 Union Commerce Building • Cleveland, Ohio 44115
(216) 241-2356

The Cleveland-Cliffs Iron Company

Equal Opportunity Employer M/F

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Senior IMS Systems Programmer

To $30K — San Francisco

Our Bay Area Client has an immediate opening for an IMS Systems Programmer. This position requires six years in Data Processing with a minimum of three+ years in IMS/MVS internals. Responsibilities include maintenance, generation and troubleshooting of an IMS/VS DB/DC system in an MVS/SNA environment. Other duties include performance monitoring, tuning, data base recovery procedures, maintenance of on-line test environment, MTO training and applications/operations support. This position requires excellent oral and written communication skills, high level knowledge of IMS/VS Utilities/Internals, ALC MVS/SNA from a Debug/Performance Tuning standpoint. Relocation expenses will be paid and an excellent benefits package is offered.

We are consultants to management. For immediate consideration, please send resume and salary history in confidence to: **Gary R. Schultz, One Maritime Plaza, Suite 1350, San Francisco, California 94111. (415) 956-7120.** Employer assumes fee.

professionals for computing, inc.

Software Engineers

At Codex, the work is challenging because we are the leaders in high speed/high performance data communications products and systems. If the challenge of working for a leader reflects your goals, look us up.

Opportunities exist for Software Engineers to work with advanced microprocessor architecture and applications for data communications products. You'll be developing operating systems and applications software in a multiplexer real-time environment. A BS or MS in Computer Science is required. Programming experience on minicomputer/microprocessor systems will open up opportunities to advance to senior level positions.

If you're qualified, don't hesitate to send us your resume, including salary history, in confidence, to: Art Bullung, Codex Corporation, 20 Cabot Boulevard, Mansfield, MA 02048.

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MANUFACTURING DATA PROCESSING CAREER OPPORTUNITY

Health Care Products

Highly visible MIS department seeks a Programmer Analyst possessing 2 years of solid MRP design and programming experience.

Position offers high challenge in a 370-145, DOS-VS TOTAL-8, ENVIRON-1 environment.

Primary responsibility will be to provide manufacturing systems support in a $50 million, 50-year-old manufacturing company of captial goods and health care products used in hospitals worldwide.

We can offer competitive compensation including substantial incentives, a professional and comfortable working environment, highly attractive living and recreational opportunities in Southeast Indiana, far away (but not too far away) from the maddening crowds.

Interested candidates should forward a summary of their qualifications to:

Mr. Ted Hartshorn
Director of MIS
Hill-Rom Company, Inc.
Batesville, Indiana 47006
812/934-7497
An Equal Opportunity Employer M/F

HEALTH CARE

Director, Data Processing
LA JOLLA, CALIFORNIA

Interfacing with all levels of Management, the Director plans, develops and provides state-of-the-art computer services for a multi-specialty medical and research facility.

Min. Requirements: 5 years exp. including two years in management. In-depth knowledge of third party billing, medical records and admission procedures. Demonstrated expertise in systems operations and personnel supervision.

The Scripps Clinic and Research Foundation overlooks the blue Pacific just a few miles north of San Diego. Nationally renown in science and health care, we offer a highly professional environment coupled with an outstanding salary and benefit package.

Send resumes in complete confidence to Norma Newell, Director of Personnel, Scripps Clinic & Research Foundation, 10666 No. Torrey Pines Rd., La Jolla, CA. 92037.

SYSTEMS ANALYST/ PROGRAMMER

Degree in computer science with 4 years' experience on various computers, operating systems and languages. Knowledge of microprocessors and some project leader experience essential. Duties: project planning, systems analysis, computer program development, implementation and integration of complete operational system, documentation and project reporting. $21K-$23K per year. 40 hour week with excellent fringe benefits.

Call or send resume to:
Henry Anzalone
Personnel Manager, IOCS
400 Totten Pond Rd.
Waltham, MA 02154
(617)890-2299
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OPPORTUNITIES IN VERMONT

Major electric company needs individual who enjoys the benefits of country living (mountains, lakes, heart of ski country, good atmosphere for raising a family.)

PROGRAMMER/ ANALYST

Individual must have analystical experience and a minimum of 4 years of Cobol programming. Responsibilities will include applications software development for on-line systems, as well as providing support for existing systems. CICS experience will be a valuable asset.

Send resume with salary requirements to:

Kathy Knight
Employment & Comp. Admin.
Central Vermont
Public Service Corp.
77 Grove Street
Rutland, Vermont 05701

Central Vermont Public Service CORPORATION

An Equal Opportunity Employer M/F

Software Specialist I

To assist in the maintenance and development of system programs for the University of Montana DECSYSTEM-20. Missoula is located in the heart of the Rockies with excellent hiking, fishing, and skiing. A bachelor's degree in computer science or a closely related field and 2 years data processing experience, including programming, working knowledge of an assembler, FORTRAN, and COBOL are required. Knowledge of TOPS10 or TOPS20 and PASCAL preferred.

Apply by 5/7/79 to EO/PERSONNEL, 260 Lodge, University of Montana, Missoula, MT 59812 *An Equal Opportunity/AA Employer.*

'MINI' SPEC.

Newoppty. in Conn. for indiv. with DEC-10 or PDP/11 and related software to design sophisticated distributed processing system. Salary to $26,000. Contact Paul Meissner or Stan Durbas.

Robert Half of Hartford
Agency
111 Pearl St.
Hartford, Conn. 06103
(203) 278-7170

COMPUTER PROFESSIONALS

L'EGGS PRODUCTS, A Division of Hanes Corporation, and the world's number one manufacturer of women's hosiery, has 4 outstanding data processing opportunities offering unlimited advancement potential. All are additional positions on our rapidly expanding staff, located in the Winston-Salem, North Carolina headquarters. Each requires a degree, preferably in computer science, and DP experience on large scale equipment in a business environment, and strong written/verbal communications skills:

SYSTEMS PROJECT MANAGER

Master's degree preferred

Requires 5-7 years system analysis experience, at least 3 in systems analysis or higher, and the following:

- **A clearly demonstrated ability to lead the design and programming efforts for major systems applications**
- **Project planning and reporting exposure**
- **Proficiency in COBOL or Assembly Language**
- **Supervisory responsibility**
- **Broad exposure in financial and/or order processing systems Minicomputer experience desirable**

PROGRAMER ANALYST

Requires strong FORTRAN programming experience and:

- **Time-sharing experience**
- **Honeywell experience preferred**

Duties are to code test and implement on-line business applications programs.

PROGRAMMERS

Requires 1-2 years programming experience. One position requires experience in business applications on large scale Honeywell time sharing environment, with on-line programming in FORTRAN language. Second position requires experience in assembler or data-share language on datapoint or other mini-computer equipment. Duties are to code test and assist in the total implementation including user training, plus the enhancement and maintenance of existing programs, systems, and data bases.

If your background matches the requirements for any of these positions, then send resume including salary history in strict confidence to:

Recruiting Coordinator
L'EGGS PRODUCTS
P.O. Box 2495
Winston-Salem, N.C. 27102
Affirmative Action Employer

DATA PROCESSING MANAGER

MAKE A MOVE THAT MAKES SENSE

Situation: You've got a nice position with good pay in a big city.
Problem: You also fight ulcer-producing traffic to get to it; have to live with pollution, increasing crime, unrealistic prices and unfriendly people.
Solution: Take a not-so-nice job at less pay in a little town where nothing ever happens?
WRONG!
Solution: Take a great position paying a highly competitive salary in a clean, safe and friendly city where everything you would like to happen - does. RIGHT!

The position is with Safelite Industries, a growth oriented manufacturer & distributor listed on the NYSE. The city is Wichita, Kansas, intelligently progressive, unpolluted, located in the center of the U.S., and filled with 381,200 friendly people.

If you have 6-8 years commercial Data Processing with current systems and program skills; have IBM equipment knowledge of systems 3 model 15 / systems 34; and will accept the responsibility for the supervision of 28 people, Safelite wants to meet with you. In addition to the competitive salary, Safelite also offers a good benefit package. Your interview trip, and all relocation expenses will, of course, be paid.

Make the move to Safelite and Wichita - it makes sense.

Please send resume along with salary history and requirements to Mr. Dennis Smith:
P.O. Box 1879 **Wichita, KS 67201**

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If you are a career oriented professional who puts equal emphasis on the quality of living conditions, **THINK SOUTH!** Due to the unprecedented growth and continued expansion the South is experiencing, there exists a severe shortage of qualified E.D.P. Professionals. If you are interested in exploring career opportunities in the **SUNBELT,** call Jim Schwab at 704/375-0600 (no resume needed) or send your credentials to the address below. All fees, to include interview and relocation expenses are paid by our client companies. A sample of our current numerous E.D.P. opportunities are as follows:

Project Mgr. Warehouse/Distribution Systems	To $34,000
Systems & Programming Mgrs., OS, COBOL	To $30,000
Senior Systems Analysts, OS, Manufacturing Sys.	To $28,000
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Systems Programmers, IMS & MVS	To $24,000
Programmer Analysts, PL/1, OS, Business Appl.	To $22,000
Programmer Analysts, COBOL, OS, Business Appl.	To $21,000
Numerous COBOL Programmers Needed	To $20,000

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E.D.P. SPECIALISTS

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PROGRAMMER ANALYST

UNC Mining & Milling, a division of United Nuclear Corporation, the world's leading independent producer of uranium, is currently seeking a Programmer Analyst to work within the Data Processing operations at our Church Rock facility. Requirements include 2-3 years experience with IBM 370 and mini-computer background.

We offer excellent salaries with future increase and advancement based on merit. Our benefit program is comprehensive and includes relocation costs, family hospital, medical and dental coverage. Employees also receive a retirement program, an investment plan, life insurance, educational assistance, paid holidays and paid vacations.

For prompt and confidential consideration, please send resume to:

Wayne Bennett

UNC

UNC Mining & Milling
Division of United Nuclear Corporation
A UNC Resources Company
Post Office Drawer QQ
Gallup, New Mexico 87301
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METHODS ANALYST

Need motivated individual for management systems staff to conduct work flow studies, set standards and evaluate alternative approaches to implement operational improvements. Must meet these minimum requirements:

- Degree in industrial or systems engineering or related field
- Two to four years experience conducting cost feasibility, work measurement and work simplification studies in clerical environment
- Certification in predetermined time systems, preferably AQC
- Basic COBOL program training

Please send resume with salary history, in confidence, to:

Personnel Department

Blue Shield of Cleveland

An Equal Opportunity Employer M/F

MEDICAL MUTUAL OF CLEVELAND, INC.
2060 East 9th Street
Cleveland, Ohio 44115

INSTRUCTOR

COMPUTER PROGRAMMING

Four quarter teaching contract, start date prior to May 14, 1979. Established program, using IBM 360/40, IBM 4331 on order. Requirements include three years substantial experience, minimum education Associate degree or equivalent, prefer at least Baccalaureate and community college teaching experience. Preferred language COBOL, BAL or RPG II, will consider PL/I, FORTRAN, or BASIC. Applications close April 25 or until position filled. To apply, submit application and resume to **P. B. Greedy, Director of Personnel, Western Iowa Tech Community College, 4647 Stone Avenue, Sioux City, Iowa 51106.** An Equal Opportunity Employer.

ATLANTA

CONSULTING

$23-$35,000 + BONUS

Well known consulting firm seeks individual able to apply EDP experience in solving diversified mgmt. problems in a variety of business environments. Ideal candidate will have a degree, 2-5 years DP or Customer "trouble-shooting" experience and excellent communication skills. Unlimited growth potential.

SYSTEMS ENGR.

$24-$29,000

Well known Computer Hardware and Service vendor seeks individual who enjoys "trouble-shooting" hardware/software in an on-site customer environment. Requires degree, background in technical support, i.e., Systems Programming or similar. Excellent growth and employee benefits.

For immediate consideration on above or other nationwide EDP opportunities, call Ron Spang at 404/393-0933, or send resume to:

FOX-MORRIS
Personnel Service
47 Perimeter Ctr. East, N.E.
Atlanta, GA 30346

Senior Systems Programmers

Progressive EDP environment seeks aggressive individual w/experience at systems level problem determination, advise + consult w/network users. Exp. should include CICS/VS TP network OS/-VS1, PARS/ACP ideal. IBM equipment. a +. Sal. to $26,000. Resume + Sal. req. to

Professional Search Personnel
4900 Leesburg Pike #311
Alexandria. Va. 22302
(703) 671-0010

ITT AIMCO DIVISION

IPICS MANAGER

The Position:
Establishes operational procedures in the training and development of all levels of management in the use of an IPICS system.
Co-ordinates the implentation of an IPICS system on an IBM System 3, Model 15D (RPG II language).
Functional responsibility in Material Management Planning with various departments.

The Candidate:
Will possess a degree in Industrial Management or equivalent. Five years experience in implementing software packages and writing RPG II language. Systems Analyst background would be an advantage.
Qualified applicants, willing to accept the challenge of this demanding position with a rapidly expanding company in the automotive parts industry, should forward a resume in confidence to:

PERSONNEL MANAGER - DRUM DIVISION
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435 CREEKSIDE DRIVE
TONAWANDA, NEW YORK 14150
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More Than 75 Outstanding CPE Specialists Now Work at FEDSIM. Join a Team of Experts!

The Federal Computer Performance Evaluation and Simulation Center (FEDSIM) is seeking both entry-level and experienced CPE analysts. FEDSIM orovides consultant services to other Federal agencies in such areas as:

- Evaluating the performance of hardware configurations, operating systems, application programs, data base management systems, and communications systems. Applicants for these positions should have detailed experienced in system programming, with such systems as MVS, EXEC-8 and GCOS and must have an understanding of both operating system internals and computer technology.
- Assessing the operational efficiency, management practices, and organizational effectiveness of data processing installations. Applicants for these positons should have experience in EDP management, EDP auditing, or EDP management consulting.
- Performing capacity planning studies, which include workload requirements analysis, configuration sizing and communications network design and evaluation, and providing ADP procurement assistance in such areas as benchmark design, specifications development, proposal evaluation and life-cycle planning. Applicants for these positions should have experience with hardware and software evaluation and with computer and/or communications system modeling techniques.
- Assessing the design and predicting the performance of special purpose computer systems, and analyzing the overall performance of complex systems that contain computers as integral subsystems. Applicants for these positions must be knowledgeable in Operations Research techniques, computer operating systems, and discrete-event simulation languages.

Salaries range from $15,090 to $30,750 with excellent opportunity for management responsibility. Advanced degree desired, Send resume of qualifications and salary history to:

Dept. of the Air Force
FEDSIM/CC
Washington, D.C. 20330
Offices located in Alexandria, VA.
AN EQUAL OPPORTUNITY EMPLOYER

SENIOR PROGRAMMER ANALYST/PROJECT LEADER

We are Colonial Insurance. We're a new and highly motivated company with a wealth of aggressive ideas with which we'll be challenging the industry leaders. As a new company, we seek those professionals who can bring a growth-charged intensity to their work.

Qualified candidate should be able to take projects from beginning to end. This includes developing specs with the user over all and detailed design programming and testing implementation and close system tuning. A project may require the individual to give work direction to one or more individuals on a project or handle the project completely by himself. Should have some experience with COBOL and be involved with DOS/VS/VM and IBM 370/148. On-Line design experience, preferably with CICS, is essential as the less experienced staff members will look to the individual for on the job training in the technical areas of on-line design and programming.

Qualified person will want to get involved in the existing systems and new development, essentially 60/40 split analyses/programming.

If you have the qualifications to work within our fast growing Data Processing department, Colonial can offer you a superior starting salary. For more information, please call:

Kayla Iwanski
(714) 991-7300

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710 N. Euclid
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PROGRAMMER/ANALYSTS

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If You Are The Best, Why Not Work For The Best?

We have current openings for:

- **Business System analyst/programmers experienced in COBOL, PL/1, IMS, DMS, IDS**
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- **Engineering analyst/programmers with time sharing experience.**

We have an excellent starting salary for those with demonstrated expertise; regular increases are based on individual merit. Our benefit package is second to none, and relocation costs are provided. If you think that individual effort is important, and want to work for a company that agrees with you, call or send your resume to Mr. Ed Lyons.

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SENIOR MANAGEMENT

Expanding NYSE-listed data processing service company has a Senior Management position open in the Chicago area.

Applicants should have the experience and ability to direct a field service organization engaged in maintenance of a wide variety of computer equipment. Responses will be handled in strictest confidence. Send replies to:

CW Box 1912
797 Washington St.
Newton, MA 02160

Equal Opportunity Employer M/F

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TECHNICAL SUPPORT STAFF

PSDI is expanding its Applications Department and needs people familiar with the PROJECT/2 software system for Boston, S.F. and Texas. Send resume and salary history to:
Daniel D. Dudek, Jr., Manager, Application Services
PROJECT SOFTWARE & DEVELOPMENT, INC.
14 Story Street, Cambridge, MA 02138
Equal Opportunity Employer

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Be Part of a Select Design Group for the Leader in Male Apparel Manufacturing.

One or more years ASSEMBLER programming and design experience needed to work on a wide range of challenging design projects. A degree or some college training is preferred.

We offer an excellent compensation program including 3 weeks vacation after your first year. For immediate consideration, write to Mary Economos.

Hart Schaffner & Marx

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Chicago, IL 60606
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WANTED

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ANALYSTS **SOFTWARE**

1+ years exper. all computers

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* Data Base Adm.
* Project Leaders-EDP Auditors

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2 Palo Alto Sq., # 920
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Jerry Anderson
415-434-1900
111 Pine St. # 1510
San Francisco, CA 94111

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Programmers----------To $18K

MIDWEST
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Conversion Analysts---To $23K
Programmer Analyst----To $17 6K

Employer Retained

TM ASSOCIATES AGENCY
500 S. Main, Orange, Calif.
Zip 92668 714/835-3541

University of Oregon Health Sciences Center in Portland, Oregon is installing an IBM 370/148 under OS/VSI. Position requires four years programming experience; one year experience in IBM software maintenance; and modification programming. Desirable experience: generation, and tuning of CICS and DLI.

Salary range $1,578 - 2,017. Send resume to Bob Boozer, Personnel, 3181 S.W. Sam Jackson Park Road, Portland, Oregon 97201, *an Equal Opportunity Employer.*

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3001 S. State St.
Ann Arbor, Michigan 48104
Phone: 313-994-5632
(Mail or collect calls to C.W. Page)

Arizona State University

SYSTEMS SUPPORT ANALYST II

Systems Support Analyst II to work in communications with IBM 370 OS and PDP 11/70 under RSTE. Position requires working knowledge of IBM HASP protocol as well as 3270. Some knowledge of SNA or X.25 or SDLC protocols also desirable. Job will deal with data communications for ASU computer services which includes DECNET and a HASP box interface between the PDP 11/70 and IBM machines. Annual salary $16,208. Application period ends May 17, 1979. Send resumes to Arizona State University Personnel Department, Tempe, Arizona 85281. A criminal history record check will be required of the successful applicant.

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Affirmative Action Employer.

PROGRAMMER

SENIOR PROGRAMMER ANALYST $28,000

Major communications corporation has an opening for an indiv at their Corporate Data Center located in New Jersey. You will be responsible for the design and implementation of a CICS Customer Information Retrieval System. Duties will include Systems flow charting, cost benefits analysis, On-Line Time Estimation, Systems Documentation, and complete design programming using ANS COBOL. The hardware environment is a 370/168/MVS. This position has strong potential for movement into management, most likely, as a Project Manager of On-Line Systems.

Included with the attractive starting salary, the company offers a cost of living increase and merit increase within the first year. Qualified individuals should contact

NEIL LANG at 201-994-4730 or send resume in complete confidence to:

Central EDP Corporation
513 W. Mt. Pleasant Ave.
Livingston, NJ 07039

PROGRAMMERS

National software firm has openings throughout the United States for programmers with 2+ yrs. exp. on any large scale system. Background can be COBOL, FORTRAN, PL/1, MARK IV or BAL. Salaries from $17-27,000. All relocations paid. Resume & sal. to

PROFESSIONAL SEARCH PERSONNEL
4900 Leesburg Pike 311
Alexandria, Va. 22302
(703) 671-0010

Director of Software

(Scientific Application)

As a leader in our industry, we supply state-of-the-art medical diagnostic equipment to the health care market. Our products utilize minicomputers, microprocessors and a variety of peripherals.

We have an excellent opportunity for an individual to direct all Software Engineering activities, including software design, development of software maintenance programs and software support for the engineering department. Your background should include 7-10 years experience in an industrial or scientific product related environment and you should possess an in-depth knowledge of modern programming techniques. Your accomplishments should indicate your project/program leadership capabilities, organizational and supervisory skills and ability to coordinate and monitor large scale programs. A BS degree in Engineering or Computer Science is required and an MS is preferred.

As a member of our highly creative, people oriented organization you will have a unique opportunity to contribute to our leadership position and enhance your own career development. As with our products, you will find our compensation and benefit plans also make us a leader. We are located in an attractive Northern suburb of Chicago. For immediate consideration, send detailed resume including salary requirements in confidence to:

CW Box 1897
797 Washington Street
Newton, MA 02160

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DATA PROCESSING INSTRUCTOR

PASADENA CITY COLLEGE

Instructor for vacationally oriented DP program. Must be eligible for California Community College Credential and have minimum of two years' nonteaching experience in DP.

Applications evaluated for experience with IBM 360/370, OS/DOS, JCL, BAL/ALC, RPG, BASIC, etc. Ability to teach FORTRAN and COBOL essential.

Closes May 14

Office of Personnel Services
Room C - 215 - C
Pasadena City College
1570 E. Colorado Blvd.
Pasadena, CA 91106
(213) 578-7388
AN AFFIRMATIVE ACTION EMPLOYER

ASSISTANT PROFESSOR, COMPUTER SCIENCE

The Department of Mathematical Sciences of Illinois Benedictine College will have an Assistant Professor tenure-track position open beginning August 27, 1979. This position calls for a person with demonstrated teaching ability in computer science at the undergraduate level. In addition to the usual teaching and advising duties, candidates should be able to provide leadership in developing internship opportunities for students in this new computer science major. Qualifications include a master's degree or earned doctorate in computer science with experience in microprpcessors and minicomputers as well as a strong background in mathematics. The salary for this position is commensurate with experience and qualifications.

The closing data for application is April 30, 1979 and bi-weekly thereafter until the position is filled. Send resume, transcripts and three letters of reference to:

Dr. Rose A. Carney, Chairman
Dept. of Mathematical Sciences
Illinois Benedictine College
Lisle, Illinois 60532
(312) 968-7270
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Come to California where we have a fantastic year round climate. Recreational facilities include the ocean, mountains (skiing) and the desert. Immediate requirements in the following areas.

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* SR. PROGRAMMER ANALYSTS
* PROJECT LEADERS
* SOFTWARE - COMMUNICATIONS
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or call toll free:
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An Employer retained agency

DIRECTOR OF MANAGEMENT INFORMATION SYSTEMS

New position opportunity at West Virginia University. Under the Office of the Vice President for Administration, responsible for directing, managing, and developing management information systems for administrative and academic users. Defines new information systems requirements to support policy and administrative decision making. College Degree or equivalent. Work experience in designing and implementing management information systems under project management and a phased development approach. Managerial work experience including directing, planning, and developing management information systems. Forward resume of qualifications along with salary history to: **Dr. Edwin Smith, Chairman, Search Committee, West Virginia University, Stewart Hall, Morgantown, WV 26506.** Please apply by May 31, 1979. West Virginia University is an Equal Opportunity/Affirmative Action Employer M/F.

PROGRAMMER/ANALYST
$16-19,000

Opportunity for a take charge programmer/analyst in a northeastern Illinois school district. Challenging assignments from general ledger to student recordkeeping. Currently using IBM System 3 Model 12 RPG II, OCL, cardless disk system, early 1980 schedule for System 38. Minimum 2 years experience with educational environment preferred. Resume and salary history to: **Don Vinlove, Valley View School District, 636 Dalhart, Romeoville, Illinois, 60441.**

The Washington Metropolitan Area Transit Authority is soliciting proposals for computerization of transit scheduling functions, including implementation of a run coupling subsystem and other subsystems. The effort includes design of a schedule data base system, development of subsystem software, on-site testing with existing WMATA hardware, and training of WMATA personnel. Request for Proposal will be available on or about April 4, 1979. For further information, please contact:

Mr. Richard Lucas
Office of Budget and Mgmt. Ana.
Wash. Metro. Area Transit Auth.
600 Fifth Street, N.W.
Washington, D.C. 20001
metro (202) 637-1702

LEAD SCIENTIFIC PROG.

Intemat. electronics mfr. seeks highly analytical & creative sclentific prog. to direct proj. team supporting new dev. systems. FORTRAN, PL-1, or APL desirable. Interview & reloc. expenses paid. Unlimited growth potential. Salary $25,000 range (Fee Paid.) Contact Gerry Battista.

Robert Half of Boston
Agency
100 Summer Street
Boston, MA 02110
(617) 423-1200

Programmer/ Analysts $18 to $29K

San Francisco Bay Area

Several of our Bay Area clients have immediate openings for IBM Programmer/Analysts with a minimum of one year COBOL experience. Manufacturing, Finance or Distribution experience is desired. Positions offer excellent benefit packages.

Please call or send resumes in confidence to: **Gary R. Schultz, One Maritime Plaza—Suite 1350, San Francisco, California 94111. (415) 956-7120.** Employer assumes fee

professionals for computing, inc.

PRINCIPAL PROGRAMMER ANALYST

Immediate career position open for experienced individual. Duties include design of DP systems, development of programs, supervision of data entry and programming personnel, and responsibility for operation of an RJE system. Requires B.S. in computer science or related field plus 5 or more years experience preferably in the health field.

Send resume to:
Dr. Girma Wolde-Tsadik
C.R. Drew Medical School
1647 E. 120th Street
L.A., CA 90059

For further information call (213) 603-3045.

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PROGRAMMER ANALYST

The City of Yakima, WA is seeking applicants for the position of Programmer Analyst to perform systems design and programming duties at a salary of $1451/mo. D.O.Q. Requires 3 years progressively responsible experience in developing and maintaining related computerized application programs associated with third generation data processing equipment including some experience with systems analysis, knowledge of RPG, Assembler, and COBOL languages desirable. Apply by May 17, 1979 at City of Yakima Personnel, 129 No. 2nd Street, Yakima, WA 98901. An Equal Opportunity Employer.

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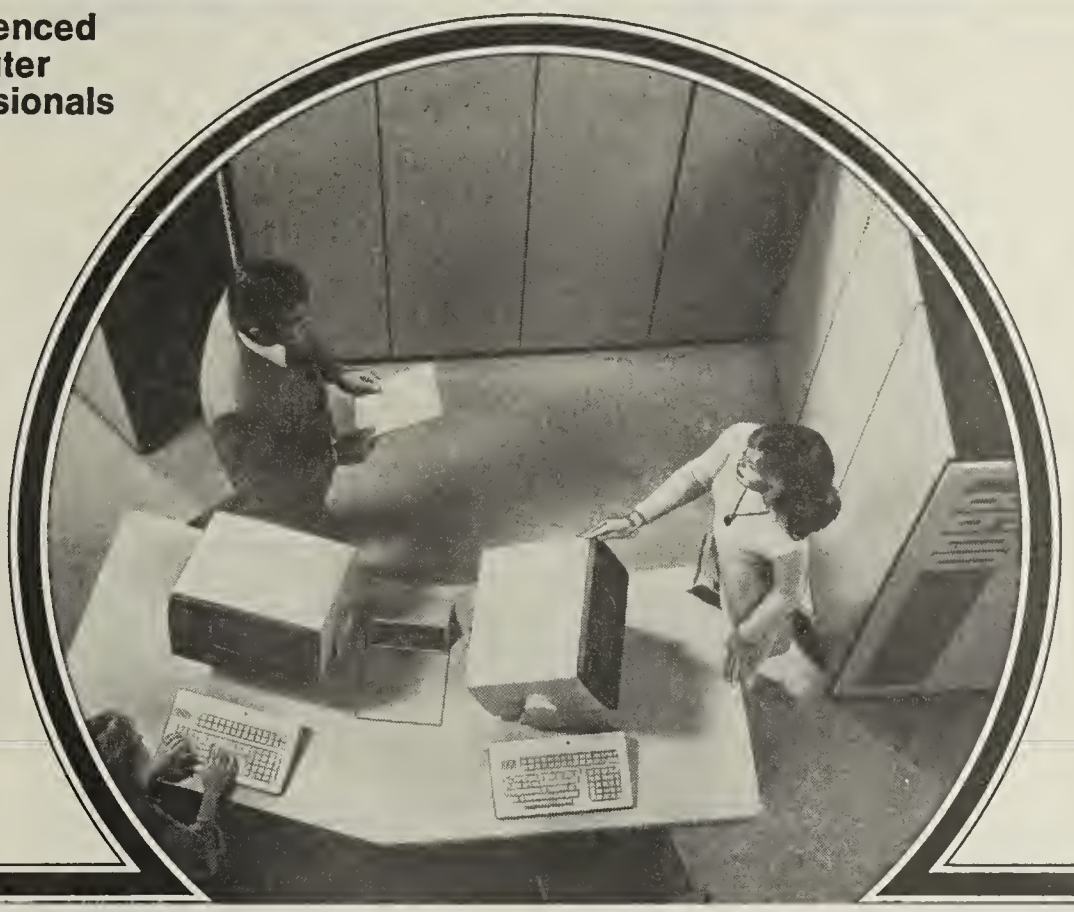

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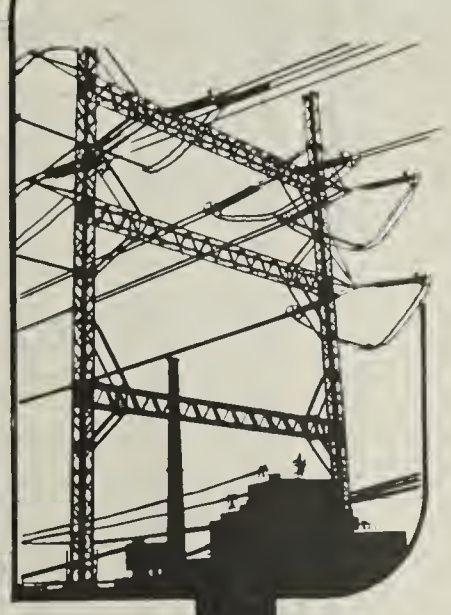

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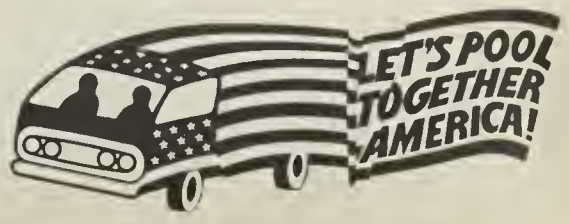

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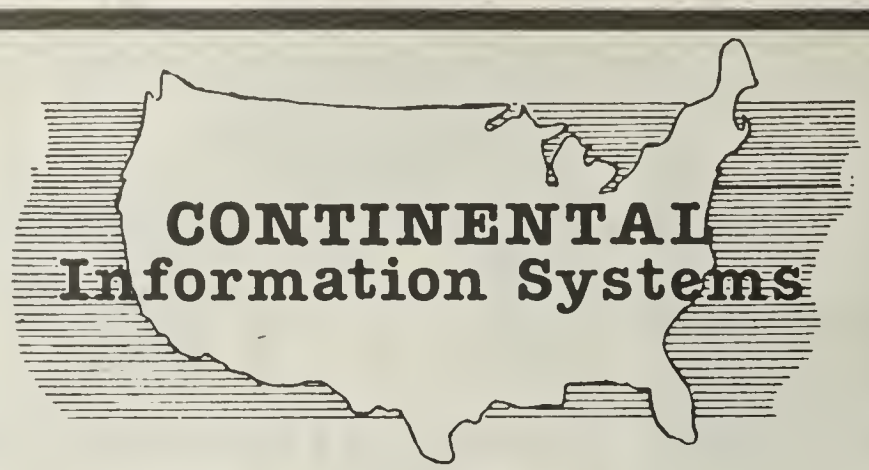

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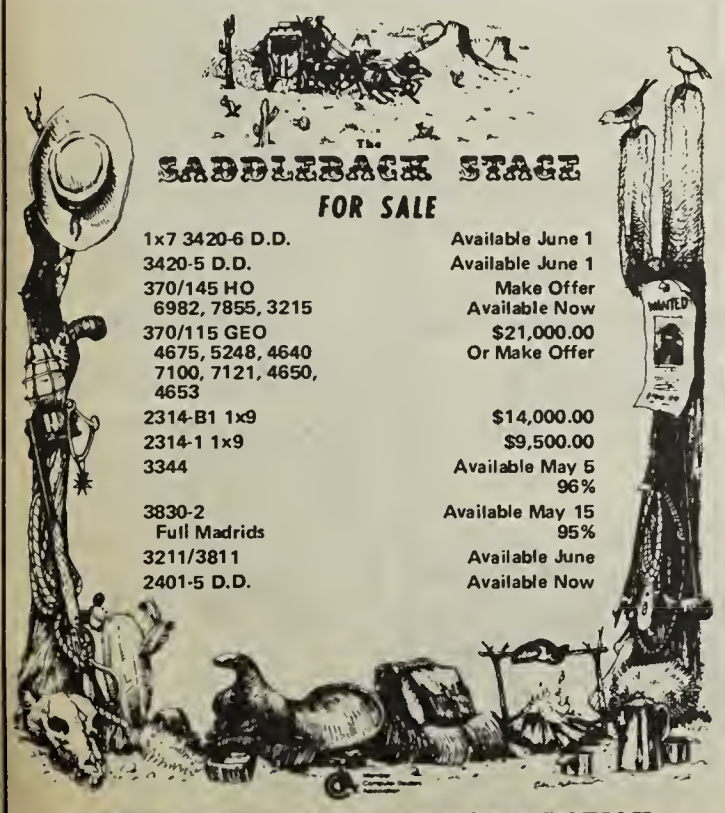

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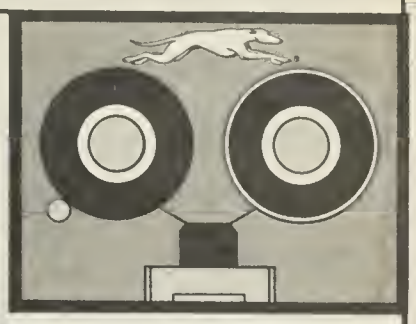

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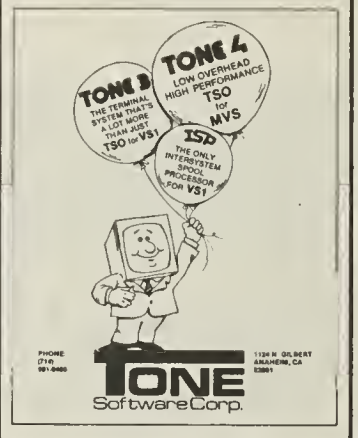

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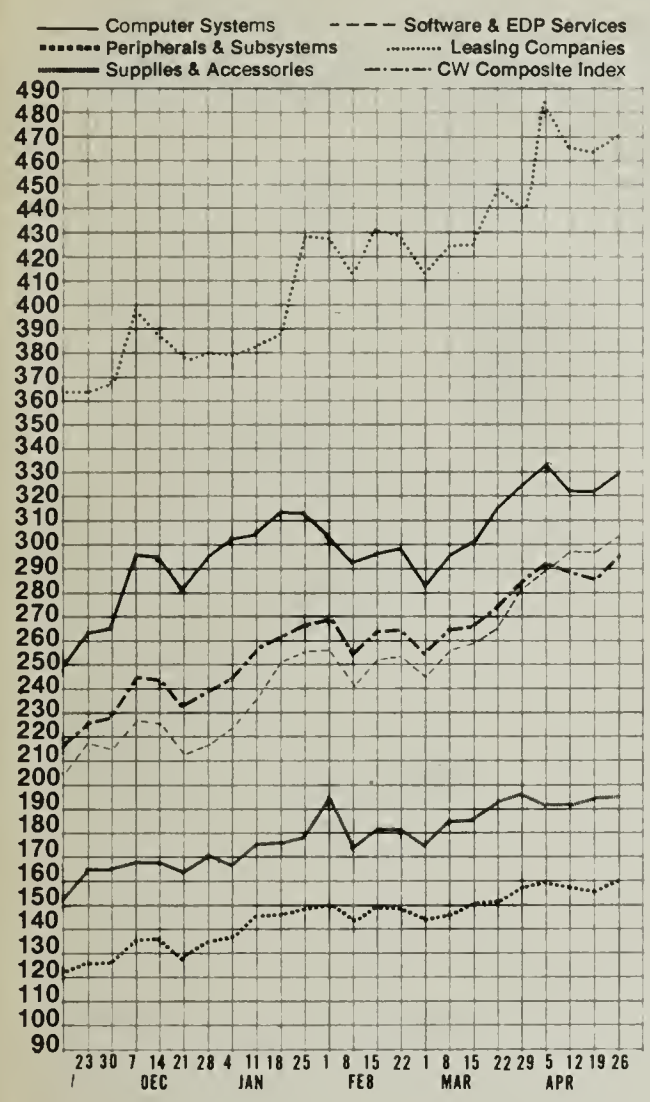

Earnings Reports

AMERICAN MICROSYSTEMS
Three Months Ended March 31

	1979	a1978
Shr Ernd	$.35	$.37
Revenue	23,232,000	19,037,000
Tax Cred	368,000	520,000
Earnings	1,344,000	1,379,000

a-Restated to reflect merger.

BOLT BERANEK & NEWMAN
Three Months Ended March 31

	1979	1978
Shr Ernd	$.01	....
Revenue	10,382,500	$7,863,300
Earnings	15,100	(85,000)
9 Mo Shr	.04	....
Revenue	27,574,400	21,674,000
Earnings	50,400	(358,700)

BUNKER RAMO
Three Months Ended March 31

	1979	1978
Shr Ernd	$.89	$.46
Revenue	105,748,000	85,830,000
Earnings	5,857,000	2,923,000

COMPUGRAPHIC
Three Months Ended March 31

	1979	1978
Shr Ernd	$.92	a$.72
Revenue	61,653,000	46,261,000
Earnings	4,549,000	3,424,000
6 Mo Shr	1.74	e1.27
Revenue	117,056,000	84,398,000
Earnings	117,056,000	84,398,000
Earnings	8,610,000	5,996,000

e-Adjusted to reflect two-for-one stock split paid in June 1978.

COMPUTER COMMUNICATIONS
Three Months Ended March 31

	1979	1978
Shr Ernd	$.38	$.12
Revenue	8,146,298	5,078,527
Tax Cred	....	360,000
Earnings	1,404,506	742,906
9 Mo Shr	....	.52
Revenue	12,036,008	13,399,733
Tax Cred	....	973,000
Earnings	(204,935)	1,591,704

e-Restated.

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 25, 1979

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

EXCH		1978-79 RANGE (1)	CLOSE APR 25 1979	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	28- 69	42 3/4	+4 7/8	+12.8
N	BURROUGHS CORP	59- 87	71 1/4	- 1/4	-0.3
C	COMPUTER AUTOMATION	15- 44	20 1/2	+ 1/2	+2.5
N	CONTROL DATA CORP	23- 44	36 5/8	+2 1/4	+6.5
C	CRAY RESEARCH INC	8- 33	28	+2	+7.6
N	DATA GENERAL CORP	42- 73	70 3/4	+1 1/2	+2.1
N	DATAPOINT CORP	34- 82	77	-1	-1.2
N	DIGITAL EQUIPMENT	39- 58	54	+ 5/8	+1.1
N	ELECTRONIC ASSOC.	2- 13	6 1/2	+ 3/8	+6.1
A	ELECTRONIC ENGINEER.	9- 19	11	+ 1/8	+1.1
N	FOUR-PHASE SYSTEMS	19- 46	36 7/8	+2 3/4	+8.0
N	FOXBORO	28- 40	36 3/4	- 1/4	-0.6
O	GENERAL AUTOMATION	7- 26	16 1/2	+1	+6.4
C	GRI COMPUTER CORP	1- 3	1 3/4	0	0.0
N	HEWLETT-PACKARD CO	62- 96	94 3/4	-1	-1.0
N	HONEYWELL INC	43- 76	67 1/2	-2	-2.8
N	IBM	236-321	312	0	0.0
C	MANAGEMENT ASSIST	9- 29	25 1/8	+3 3/8	+15.5
O	MANUFACTURING DATA S	9- 25	24 1/4	+1 3/4	+7.7
C	MICRODATA CORP	10- 23	21 1/2	+ 1/4	+1.1
C	MINI-COMPUTER SYST	4- 8	5	0	0.0
C	MODULAR COMPUTER SYS	7- 18	16 5/8	+ 1/8	+0.7
N	NCR	37- 72	69	0	0.0
N	PRIME COMPUTER INC	20- 43	36 1/4	- 1/4	-0.6
N	PERKIN-ELMER	17- 34	31 5/8	+ 5/8	+2.0
N	SPERRY RAND	33- 51	49	- 1/4	-0.5
A	SYSTEMS ENG. LABS	11- 24	15 3/4	- 3/8	-2.3
O	TANDEM COMPUTERS INC	13- 37	29 1/2	- 1/2	-1.6
A	WANG LABS.	12- 43	42 1/2	+2 1/4	+5.5
	LEASING COMPANIES				
C	BOOTHE COURIER CORP	13- 21	18 1/2	- 3/4	-3.8
O	COMDISCO INC	3- 21	19 1/2	+ 3/4	+4.0
A	COMMERCE GROUP CORP	1- 1	1/2	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	3 1/2	+ 3/8	+12.0
O	CONTINENTAL INFO SYS	5- 15	8	0	0.0
M	DATRONIC RENTAL	1- 3	3 1/8	+ 1/4	+8.6
A	DCL INC	3- 5	4 1/8	- 1/4	-5.7
N	DPF INC	8- 14	11 3/4	+ 1/2	+4.4
N	ITEL	16- 36	20 1/8	-1 1/2	-6.9
N	LEASCO CORP	24- 43	40 5/8	- 3/8	-0.9
O	LEASPAC CORP	1- 4	1 1/4	+ 1/8	+11.1
A	PIONEER TEX CORP	3- 7	3 1/2	- 1/4	-6.6
N	U.S. LEASING	13- 20	16	+ 7/8	+5.7
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1 3/8	0	0.0
C	ANACOMP INC	8- 22	14 5/8	- 1/2	-3.3
A	APPLIED DATA RES.	8- 17	10 3/8	- 1/2	-4.5
N	AUTOMATIC DATA PROC	24- 36	31 3/4	+ 3/4	+2.4
C	COMPU-SERV NETWORK	5- 13	12 1/2	+ 3/4	+6.3
C	COMPUTER HORIZONS	1- 9	6	+ 1/4	+4.3
C	COMPUTER NETWORK	5- 16	7	- 1/8	-1.7
N	COMPUTER SCIENCES	8- 17	12 1/8	- 1/8	-1.0
C	COMPUTER TASK GROUP	1- 5	6	+ 3/4	+14.2
C	COMPUTER USAGE	2- 4	2 1/2	- 1/2	-16.6
C	COMPUT AUTO PER SVC	4- 10	8 5/8	+ 1/8	+1.4
C	COMSHARE	6- 26	26	+2 1/2	+10.6
C	CULLINANE CORP	14- 33	24 1/4	+2 1/2	+11.4
O	DATA DIMENSIONS INC	4- 9	5 1/4	- 1/4	-4.5
O	DATATAB	1- 4	3 1/8	+ 1/8	+4.1
N	ELECTRONIC DATA SYS.	15- 25	21 7/8	+1 7/8	+9.3
O	INSYTE CORP	1- 3	1 1/4	0	0.0
C	IPS COMPUTER MARKET.	2- 3	3 1/8	0	0.0
C	KEANE ASSOCIATES	3- 6	5 1/8	+ 1/8	+2.5
O	KEYDATA CORP	1- 4	3 5/8	- 3/8	-9.3
A	LOGICON	10- 19	13 7/8	- 1/8	-0.8
A	NATIONAL CSS INC	15- 48	47 1/2	+ 3/4	+1.6
O	NATIONAL DATA CORP	7- 13	12 3/4	+ 3/4	+6.2
A	ON LINE SYSTEMS INC	12- 30	20 1/2	- 1/8	-0.6
N	PLANNING RESEARCH	4- 10	6 3/8	+ 1/4	+4.0
O	PROGRAMMING & SYS	1- 1	1 1/4	+ 1/4	+25.0
O	RAPIDATA INC	3- 7	6 5/8	0	0.0
C	REYNOLDS & REYNOLD	18- 36	30 1/4	- 3/4	-2.4
O	SCIENTIFIC COMPUTERS	3- 9	6 5/8	0	0.0
N	TYMSHARE INC	18- 41	38	- 7/8	-2.2
A	URS SYSTEMS	5- 8	5 3/4	+ 1/8	+2.2
N	WYLY CORP	1- 7	6 3/8	+ 5/8	+10.8
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	14- 32	15 5/8	- 5/8	-3.8
N	AMPEX CORP	10- 19	16 1/4	+ 7/8	+5.6
O	ANDERSON JACOBSON	5- 10	8	+ 3/4	+10.3
N	APPLIED DIG DATA SYS	9- 22	9 5/8	- 3/4	-7.2
C	BEEHIVE INT'L	3- 7	4 3/8	- 1/8	-2.7
A	BOLT,BERANEK & NEW	6- 14	13 1/8	+ 3/8	+2.9
N	BUNKER-RAMO	10- 24	23 3/4	+1	+4.3
A	CALCOMP	3- 13	8 3/4	- 3/8	-4.1
O	CAMBRIDGE MEMORIES	3- 9	3 1/2	+ 1/8	+3.7
N	CENTRONICS DATA COMP	16- 45	40 1/2	- 3/8	-0.9
C	COGNITRONICS	1- 4	2 1/4	+ 1/8	+5.8
C	COMPUTER COMMUN.	6- 10	8 1/8	+ 5/8	+8.3
C	COMPUTER CONSOLES	4- 11	10 3/4	+ 1/4	+2.3
A	COMPUTER EQUIPMENT	3- 6	4 7/8	+ 1/4	+5.4
C	COMPUTER TRANSCEIVER	1- 5	3	- 1/8	-4.0
C	COMPUTERVISION CORP	9- 48	46 3/4	+ 1/2	+1.0
C	COMTEN	9- 38	24 1/2	0	0.0
N	CONRAC CORP	13- 26	16	- 5/8	-3.7
O	DATA ACCESS SYSTEMS	3- 14	8	0	0.0
A	DATA PRODUCTS CORP	14- 25	19 3/8	+ 5/8	+3.3
O	DATUM INC	2- 6	2 5/8	+ 1/8	+5.0
O	DECISION DATA COMPUT	2- 6	4 1/4	- 1/4	-5.5
O	DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
A	DOCUMATION INC	6- 34	25 3/8	+2 3/8	+10.3
C	DATARAM CORP	6- 32	17 1/2	+1 1/2	+9.3
N	ELECTRONIC M & M	4- 9	4	- 1/8	-3.0
O	FABRI-TEK	1- 2	3/4	0	0.0
O	GENERAL COMPUTER SYS	1- 3	2 1/4	0	0.0
C	GENERAL DATACOMM IND	9- 21	18 1/2	+1 1/4	+7.2
N	HAZELTINE CORP	10- 17	15 1/4	- 1/4	-1.6
N	HARRIS CORP	17- 36	27	+ 1/4	+0.9
O	INFOREX INC	6- 11	8	- 1/2	-5.8
O	INFORMATION INTL INC	7- 12	10 1/2	- 1/2	-4.5
O	INFOTON	1- 3	3 1/4	+ 1/8	+4.0
O	INTEL CORP	26- 43	43 1/2	+1 1/2	+3.5
O	INTERSIL	7- 18	14	+1	+7.6
A	LUNOY ELECTRONICS	4- 8	6	+1	+20.0
O	MSI DATA CORP	10- 19	9 3/4	+ 1/8	+1.2
N	MEMOREX	27- 59	37 7/8	+2 1/8	+5.9
N	MOHAWK DATA SCI	6- 15	12	+ 1/4	+2.1
O	OMEX	2- 8	7	0	0.0
O	PARADYNE CORP	9- 18	16 1/2	+ 5/8	+3.9
O	PENRIL CORP	5- 12	10 5/8	+ 1/4	+2.4
N	PERTEC CORP	9- 17	10	+ 5/8	+6.6
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	RECOGNITION EQUIP	7- 13	8 7/8	0	0.0
C	SCAN DATA	1- 5	2 3/8	0	0.0
N	STORAGE TECHNOLOGY	19- 46	43 1/2	+1 3/8	+3.2
O	T BAR INC	11- 22	19	0	0.0
O	TALLY CORP.	4- 14	12	+ 1/2	+4.3
A	TEC INC	6- 13	7 1/4	- 3/8	-4.9
N	TEKTRONIX INC	33- 57	54 1/2	- 1/2	-0.9
N	TELEX	3- 9	5 3/8	- 1/8	-2.2
O	TESDATA SYSTEMS CP	9- 24	23 3/4	+6 3/4	+39.7
O	WILTEK INC	1- 2	5/8	0	0.0
A	AMERICAN BUS FORMS	6- 11	9 1/2	- 3/8	-3.7
O	BALTIMORE BUS FORMS	1- 4	1	0	0.0
N	BARRY WRIGHT	14- 34	17 1/2	+ 1/8	+0.7
O	CYBERMATICS INC	1- 1	3/4	0	0.0
O	DUPLEX PRODUCTS INC	13- 30	18 5/8	- 1/2	-2.6
N	ENNIS BUS. FORMS	8- 19	18 5/8	+ 1/2	+2.7
N	3M COMPANY	43- 66	56 5/8	+ 1/2	+0.8
C	MOORE CORP LTD	26- 34	33 3/4	+ 3/4	+2.2
N	NASHUA CORP	18- 37	23 3/8	-1 1/2	-6.0
C	STANDARD REGISTER	20- 27	25	+ 1/4	+1.0
A	TAB PRODUCTS CO	8- 16	15	+1 5/8	+12.1
E	WABASH MAGNETICS	10- 22	17 7/8	- 5/8	-3.3
N	WALLACE BUS FORMS	18- 33	24 1/2	- 1/4	-1.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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